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In Retrospect

Cosmically considered, a time interval of fifty years is negligible. But in the time scale of terrestrial events, and more especially in comparison with the average span of a human life, a period of fifty years is sufficiently significant to deserve notice. The whole number assigned to this issue of POPULAR ASTRONOMY is 400. Copies of these four hundred issues have been arranged in volumes of ten copies each, and so, with this issue, the fortieth volume of this publication is completed.

This series of forty volumes of POPULAR ASTRONOMY is successor to a series of three volumes of *Astronomy and Astrophysics,* which, in turn, is successor to a series of ten volumes of *Sidereal Messenger.* The first issue of *Sidereal Messenger* appeared in March, 1882, and consequently this retrospect covers a period of slightly more than half a century.

The idea of an astronomical magazine originated in the mind of William W. Payne, at that time professor of mathematics and astronomy in Carleton College, and director of the Observatory. The project was carried out by Professor Payne, who owned these publications and directed their editorial and financial affairs until May, 1910. Professor Payne had retired from active service in the College some months earlier but continued the management of the magazine until the date mentioned, at which time Carleton College became the owner through purchase from him.

The ten volumes of *Sidereal Messenger* cover the period from March, 1882, to December, 1891. At this time many investigations, described by the general term astrophysics, were in progress. The need for a journal for publishing the results of these investigations was felt by Professor Payne and by others. The outcome was the formulation of a plan by which the more general aspects of astronomy, as presented in *Sidereal Messenger,* should be merged with the new and more technical aspects of astrophysics in a single magazine. At this time Professor George E. Hale, director of the Kenwood Physical Observatory of Chicago, became associated with Professor Payne in this enlarged enterprise, and assumed the responsibility for the department of astrophysics in the new magazine. The joint character of this new publication is clearly indicated by the joint name given to it, viz., *Astronomy and Astro-physics.* This publication appeared regularly, under this name and with William W. Payne and George E. Hale as editors, ten times a year for three years. The numbering of issues continued the numbers of the *Sidereal Messenger* and advanced from 101 to 130 in these three

years in three volumes. At the conclusion of the third volume with the issue for December, 1894, *Astronomy and Astro-physics* was purchased from Professor Payne by the University of Chicago to be continued there as *The Astrophysical Journal*. The first issue under this new name appeared in January, 1895. The publication has continued uninterruptedly until the present.

While *Astronomy and Astro-physics* was being conducted successfully under the joint arrangement as indicated, it seemed desirable to meet in some way the growing interest in the subject of astronomy on the part of the general public. This, it was seen, would require a medium for disseminating astronomical information of a more elementary character than that published by any journal then in existence. The proposal to establish such a journal with a call for the support of all who might be interested in such a periodical was published in the April, 1893, issue of *Astronomy and Astro-physics*. It was stated that such a journal would be serviceable to the teachers of astronomy in secondary schools, and would also provide means for questions and answers and for a common interchange of ideas on the part of all its readers. It was also stated that the first issue could be brought out in September, 1893, under the name POPULAR ASTRONOMY, if it seemed wise to do so.

Evidently the interest evinced was considered sufficient to warrant such a publication, for issue Number 1 of POPULAR ASTRONOMY, consisting of 48 pages, appeared in that month. In it are papers by Winslow Upton, James E. Keeler, William W. Payne, Daniel Kirkwood, M. A. Veeder, H. C. Wilson, Lewis Swift, Eliza A. Bowen, W. F. Denning, and Charlotte R. Willard. Only a few of these are now living. They all made a marked impression upon the development of astronomy in their generation. If we were to list the contributors to POPULAR ASTRONOMY in the succeeding years, we should have a catalogue of names which would include almost without exception every name prominent in astronomical work in this country, and many from foreign countries as well.

POPULAR ASTRONOMY and *Astronomy and Astro-physics* were contemporaneous until the latter was discontinued in 1894, and POPULAR ASTRONOMY and *The Astrophysical Journal* have gone on *pari passu* from that time to this.

For the first three volumes Miss Charlotte R. Willard, a member of the teaching staff of the department of mathematics and astronomy in Carleton College was associated with Professor Payne in the editorial work of the new magazine. Beginning with volume four, Dr. Herbert C. Wilson succeeded Miss Willard as one of the editors. Dr. Wilson continued in this relationship to the magazine until the time of Professor Payne's retirement, when he assumed the responsibility for it. Dr. Wilson, assisted by Dr. Curvin H. Gingrich, who became a member of the Carleton faculty in 1909, and by Dr. Edward A. Fath, who came to Carleton in 1920, directed the affairs of POPULAR ASTRONOMY from

1910 to 1926, when he reached the retiring age. At that time the duties devolved upon the present editors.

This, in brief, is the story of the forbears of POPULAR ASTRONOMY and of its own career from its beginning to a time which in the age of man would be considered his prime. Throughout its history this magazine has received the generous support and coöperation of amateur and professional astronomers alike. We hope that its present and future may be such as to continue to merit this confidence.

The first paper in Volume 35 of POPULAR ASTRONOMY was contributed by the founder of this magazine. He was then in his ninetieth year, and still able to write most interestingly and in very easily legible handwriting. Volume 36 contains the announcement of his death before quite completing his ninety-first year. At that time forty-eight volumes, in the three series, stood as a monument to the vision, courage, and industry of William Wallace Payne, a monument worthy of being coveted by any man.

And this monument is still being reared.

NORTHFIELD, MINNESOTA, NOVEMBER 20, 1932.

The Astronomical Fraternity of the World

By DAVID B. PICKERING

PART XI

It was early in April of last year that we first saw Pasadena. The flower-lined, undulating streets of this city of sunshine offered strange contrast to the awesome and colorful immensity of the Grand Canyon of the Colorado from which we had so recently come. From Pasadena a fine highway, which later becomes a mountain road, extends for sixteen miles to the northeast, terminating at the Mt. Wilson Observatory, 6000 feet above the sea. From certain vantage points in the town one can discern, on the far crest of the mountain, the top of the great 150-foot tower telescope which marks the site of the Mt. Wilson Solar Observatory of the Carnegie Institution of Washington. It is the largest of its kind in the world.

To ascend that mountain road for the first time, in one of the regular buses that ply between Los Angeles, Pasadena, and Mt. Wilson, is an adventure in itself. At some portions it attains a grade of 14 per cent and it is so narrow that two vehicles can pass only at one or two places and therefore one-way traffic is established for certain hours each way. There are hundreds of hair-pin curves to be negotiated. At the height of a mile or more above the plain, with the wheels of the bus only inches from the outer edge of the road whose border is innocent of guard rail, you view the sheer drop into space and find that your heart is mis-

behaving a bit. Developed from an original mule-trail into one for horse-drawn vehicles, widened and graded later to accommodate motor buses and trucks, the road is still being constantly improved. They tell you that through all its evolution no life has ever been lost on the trail, a fact hard to believe.

Shortly after our bus had left its station in Pasadena it stopped to admit a huge man of ruddy countenance whom I recognized as Dr. Francis Pease of the observatory staff. It was he who had built the mounting and dome for the 100-inch Hooker telescope. We made our-

Dr. Francis Pease.

selves known to him and were welcomed to the mountain in a really human way. He told us, during the hair-raising journey, much of the history of the observatory. We arrived at last at the summit, very glad to be alive. Our bus drew up before the rustic inn which stands in a clearing overlooking the valley at the southwest corner of the reservation. To it, and the scores of cabins surrounding it, have come thousands of visitors during the last decade or so, largely impelled by interest or curiosity, to inspect the world's largest telescope. The cabins are hidden to a great extent by the forest which grows thickly to the edge of the clearings which the inn and instrument houses demand. Through the giant deodars and pines narrow dirt roads and paths wind to the

east without a level foot through all their length. Up and down dale they ramble along the edges of precipitous slopes to connect the various instrument houses, towers, and domes. For obvious reasons no artificial lighting is permitted upon observatory grounds after dark. The paths are easy enough to negotiate in the light of day but at night they become a menace indeed to one venturing forth without a torch. At the edge of the woods are tall yuccas, many preparing to bloom. In the dust of the paths, warmed by the sun, scamper little brown lizards, and just before sunset come the deer, quite up to the inn porch to be fed, as we had seen them at the Grand Canyon. They are ravenous creatures and all green growing things are at their mercy. We saw the young deodars set about among the observatory houses, surrounded by heavy wire netting to protect them from these hungry animals. Other and less innocent life is known to inhabit the nearby region, occasionally encroaching. These are wildcats and bears, equally as picturesque, but less playful.

It was in 1904 that Dr. George Ellery Hale, seeking a site for an observatory, found Mt. Wilson. Not long before that a company of Pasadena men had organized to build an inn on the mountain top, in order to cater to those holiday hikers who made this vantage point their objective. The old trail up the mountain, we were told, was first broken in 1887, and the new company at once began improving it. We met, at the time of our visit, Mr. J. H. Holmes, the sole survivor of the 28 men who originally planned the enterprise. His son-in-law, Mr. Childs, is now the acting manager of the inn. It was with Mr. Holmes' company that Dr. Hale negotiated for acreage to be used for observatory purposes. The original area has been extended until today the reservation contains well over a thousand acres.

The first instrument to be installed upon the mountain was the Snow Telescope, brought by Dr. Hale from Chicago as a loan from the Yerkes Observatory. It is a long, white, horizontal affair whose 30-inch flat and 24-inch concave mirror collect light from the sun for spectroscopic study. Three years later, in 1907, the 60-foot solar tower was built containing lenses of 12 and 4 inches. It was constructed primarily to overcome difficulties of heat which the low-lying Snow telescope invited. Another year saw the completion of the 60-inch reflector and in 1910 came that dominating structure, the 150-foot tower with its 17 and 12-inch lenses. The crowning instrumental achievement, however, came in 1917 when observations began with the world's greatest astronomical instrument, the famous 100-inch Hooker telescope. The upper portions of the two tower telescopes are the only equipment to be seen as one looks eastward from the inn.

It was after luncheon that Dr. Pease introduced us to Mr. Joseph O. Hickox, short, stocky, freckled, and ever smiling, to whose lighter duties of caring for the afternoon visitors is added the more serious work of maintaining the observational routine which employs both

tower telescopes. Together with some other visitors we were conducted by Mr. Hickox to the Museum, a daily visit starting at 1:30 for the edification of patrons of the inn. As we followed the winding roadway to the east, passing the great base of the giant 150-foot tower, we came upon the Museum. This is a low, one-room edifice whose windows are completely filled with transparancies of celestial objects photographed at Mt. Wilson. Here a short descriptive talk is given and then the guests are taken to see the 100-inch glass. At some considerable distance

THE TOWER TELESCOPES AS SEEN FROM THE INN.

from the Museum stands the dome of the famous Hooker telescope. It is a thrill indeed to come for the first time upon its gleaming immensity through the great trees. The beautifully proportioned building, 100 feet in diameter, shone brilliantly in its coat of aluminum paint. So fresh and new did this finish appear that it was hard to believe that it had last been applied three years ago. In this same manner are treated all of the observatory buildings. From the left side of the roadway a board walk extended northward to the entrance of the telescope house, midway of which is situated a trim little hut where the observers meet nightly for relaxation and to partake of the midnight lunch, which is one of the functions of the observatory life.

Before entering the huge, circular building at the ground level, one notes the metal-railed walk that extends completely around the structure at the base of the dome. A door in the dome at the side of the wide slit opens upon this balcony. Here one is struck by the huge overlap of the shutter and senses the double dome construction which the larger telescope houses have to protect the interior from temperature changes. Once inside we were confronted by a metal stairway extending far into the upper regions, but nevertheless bringing us only to the level of the telescope room, where we gazed for the first time upon the world's largest machine for gathering light from the objects in space. There it rested in a vertical position, suspended midway between the pivotal ends of the great fork which constitutes the polar axis of its English-type mounting. The giant 8-foot mirror suspended in its cell at the bottom of the immense, open-work steel frame of the "tube," was swathed in its protecting coat of felt. The glass was cast by the St. Gobain Co. of Paris and in its original state had a thickness of 13 inches and weighed 4½ tons. It was the gift of the late Mr. John D. Hooker of Los Angeles who in 1906 provided the observatory with funds for its construction. Below the mirror was seen the round hole through which the mirror may be lowered to the silvering room, where the important work of re-silvering occurs about twice a year and requires about a day and a half to perform. At the southern end of the polar axis stood the table containing the numerous push-buttons for operating the mounting. And there also were the slave clock, thermometers, and other essential accessories. Here and there stood spectroscopes, looking in their aluminum overcoats, like huge phosphorescent beetles. It all presented an awesome sight in the dim light, for the dome had not yet been opened and we instinctively spoke in hushed tones.

Here beside this sleeping giant we thought of those years of care and toil in the optical shop at Pasadena where Professor George Willis Ritchey, back in 1910, began the labor of grinding and figuring the glass casting that was to become the wonder of the astronomical world. We recalled the years of waiting for France to produce the disc, and the demand for a second disc when it was believed that air bubbles in the first were too close to the surface to permit successful grinding. Following another long delay came the ultimate decision to use the first glass after all. We further recalled those exciting days in 1917. The mounting, planned by Dr. Pease, who also designed the dome, was built at the Fore River Ship Yards in Quincy, Massachusetts, and transported by water to California, for the narrowness of railroad tunnels prevented shipment over land. It was then conveyed, in sections, up the mountain by trucks. It was during this latter process that the truck carrying the largest section of the "tube" nearly missed the road at a sharp turn, the wheels settling at the outer edge of the curve with the "tube" tilting at a sickening angle over the abyss. Some gray hairs were grown upon the heads of those who managed to pull through that affair

without serious accident.

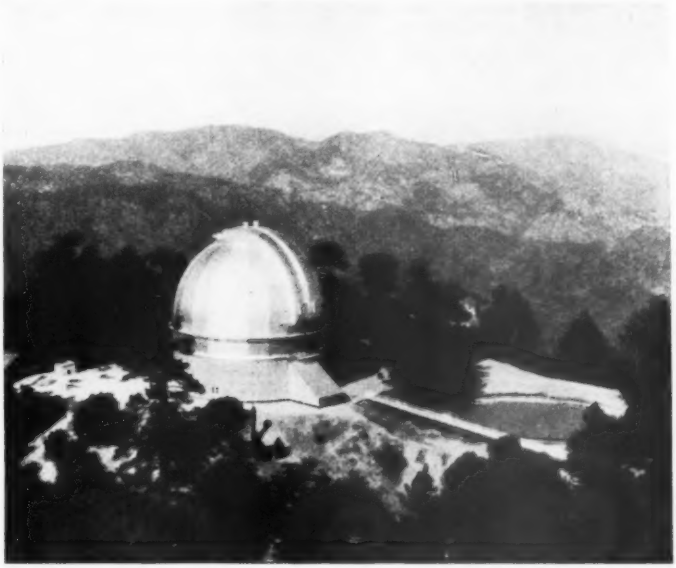
We gazed upward at the dome which weighs 750 tons and supports the observing platform which moves with it, and listened to the echoes of our voices reverberating across the vast interior. At the upper end of the "tube," opposite the mirror, is the "cage" containing the devices for the required method of observation, Newtonian or modified Cassegrainian. There are two "cages" for the latter method, of different focal lengths and having secondary mirrors about 20 inches in diameter. The flats for the Newtonian "cage" are about 20 by 30 inches in dimensions. When a change of method or focal length is required the "cage" is lifted off with tackle, lowered through the floor hole, and deposited upon a sub-level. The platform is then turned until the desired "cage" is below the hole when the tackle is attached and the "cage" adjusted to the tube.

With Mr. Hickox we went below to inspect the clock drive and the mechanism that develops the 3½ horse-power required to overcome the inertia of the mounting and change the position of the glass. There was the worm-driven wheel, 17 feet in diameter, that carries the telescope in right ascension. It was built in three sections at the Pasadena shops and the 1440 teeth around its rim equal the number of minutes in the day. The mounting floats in a bath of mercury, still believed by many to afford the only sure escape from friction during guiding. It was while we were standing below the hole in the platform that Mr. Hickox told us the following story: It happened during a visit to Mt. Wilson, for the purpose of making certain investigations, that Dr. C. G. Abbot of the Smithsonian Institution required some very delicate apparatus composed of finely drawn glass tubing. Upon the very place we were then standing, below the hole, he had, with the aid of an alcohol lamp, bent and shaped his tubes with infinite care and was nearing the completion of his delicate instrument, when he was interrupted. While he was away a tiny metal nut dropped from somewhere, rolled slowly across the platform, and, before Dr. Abbot could reach it, rolled through the hole and on to the newly made apparatus, smashing it irreparably. And, so Hickox tells, the remarkable man just stood at the edge of the hole above and laughed heartily. After hearing that, one could well believe another story they tell of Dr. Abbott while at Mt. Wilson. Down in the valley he had caught an insect, the wing of which he desired to use in a certain radiation experiment. Fearing that it might be injured in some way if he attempted to bring it up with him on the bus, he very carefully walked with this precious wing all the weary way to the top of the mountain.

It was arranged that I might return to the 100-inch later in the afternoon, when the dome would be opened and when my camera and I could have the building to ourselves.

We left it now with the group of visitors with whom we had come, my wife to return to the inn, while I went with Mr. Hickox to see his

particular charge the 150-foot tower telescope. It was about 3:00 o'clock when we reached the base of the tower. Stepping into the bucket at the side of the base, a rectangular, open metal box about two by four feet in area, we sat on the low sides while Hickox pressed a button that started us aloft. Gradually the ground fell away and the immediate landscape, which below had been hidden by the trees, now became discernible. A picture began to unfold of the various observatory buildings and the inn in their relationship to each other. From the top, the structures stood out in clear relief and among them the road writhed



100-INCH FROM TOP OF 150-FOOT TOWER.

like a brown snake. To the west lay the inn surrounded by its 50 or more detached cottages. Parked on the clearing about it were the cars of the afternoon visitors. To the northeast stood the dome of the 100-inch, opposite which and to the east of us was that of the 60-inch. Beyond this was the house of the new 50-foot interferometer. From the base of our tower extending southward stretched the white tunnel of the Snow telescope, whose length along the ground was the same as the height of the tower from which we viewed it. Beyond its other extremity rose the 60-foot tower. At varying intervals to the southeast stood the domes of the 10 and 6-inch refractors, the magnetometer building, and, at the limits of the reservation, the so-called "Monastery," the living quarters of those astronomers who are working upon

the mountain.

Far to the south and west below us the earth was vaguely reticuled by the miles of streets of the valley towns. There lay Los Angeles, 25 miles away, a gray rug flung on the landscape near the gray sea that stretched beyond awaiting the approach of the afternoon sun. To the north and east rose the mountains, with Mt. Lowe and Mt. Harvard rising above the heights to the north and to the east the wooded peaks that faded, purpling, far away in the direction of the High Sierras.

Here at the tower's top Mr. Hickox swung the dome that opened to half its extent and then moved the other half with it to any desired position. Here was the motive power also for controlling the 18-inch reflecting flat that threw the image of the sun down to the 15-inch lens fixed some distance below the floor of the dome. Descending we entered the enclosure at the base of the tower and examined the image of the sun, 17 inches in diameter, from which drawings of the sun-spots are made daily. Below us was the 80-foot pit at whose bottom a 7-inch diffraction grating, ruled with 1500 lines to the inch, caught the light of the sun passing through a slit at ground level and produced an observable, first order spectrum 20 feet long. So wide is the dispersion of this rainbow of light that the Angstrom unit is represented by about 4/5ths of a millimeter. Daily records are also made spectroscopically, of the positions and colors of the spots. It was interesting to observe the helium lines near the extreme limb of the sun, the same as were used to identify this element after its discovery on earth.

Leaving the tower we visited the new 50-foot interferometer. Its building resembles a cottage of simple design but, after the west wall is removed, the "cottage" slides away from its base upon horizontal tracks extending eastward exposing the machine to the sky. The metal mounting for this instrument was first constructed to hold a battery of telescopes and cameras to be used at San Diego for the solar eclipse of 1923. It was later converted by Dr. Pease into its present form with the expectation of extending the notable accomplishments of the 20-foot interferometer, which had measured the diameters of such stars as Betelgeuse, Antares, and others. How complicated it seemed to the uninitiated! We were shown its two 20-inch mirrors which when separated to the desired extent throw their light upon a central glass from which are observed and interpreted the resultant light-wave interferences. Up to the time of our visit this instrument had been used only to check the work of its smaller predecessor. What new truths it will reveal we can only guess.

It was late afternoon when, after leaving Mr. Hickox and the interferometer, I again made my way along the board-walk to the 100-inch telescope. Its dome was now opened in my honor and the lower door had been left unlatched to welcome me. What an exciting hour I spent in, around, and about the hollow, echoing interior of the dome. Snapping pictures, examining the tracks whereon run the 15-inch wheels

which carry the double domes, emerging through the door beside the slit to the exterior balcony, from which to view the surrounding landscape from every angle. As I left at six to return to the inn for supper the dome was bathed in the rose light from the setting sun and in its evergreen surroundings made a picture long to be remembered.

After supper we lingered about the inn watching the arrival of cars bringing guests to hear the regular Friday night lecture. This is a fixed feature of the inn management who have arranged with Mr. Wendell Phillips Hoge of the observatory staff to talk each week on the history, equipment, and accomplishments of the observatory. Several hundred people, on an average, gather for these illustrated talks which Mr. Hoge spices with just enough humor to enliven his subject. His audience is later taken for a look through the 60-inch telescope. At the close of the lecture Dr. Pease offered us an opportunity to observe with the 100-inch. We accompanied him to the dome and I soon found myself seated beside him on the narrow observing platform, a metal affair perhaps 2 feet wide by 7 long, that was reached by a vertical iron-runged ladder. There we were in the dark 40 or more feet above the floor of the observatory, and in front of me was the vague cross construction of the huge "tube." There was no eyepiece at hand, so Dr. Pease offered me a magnifying glass which he carried with him. I used, however, my little 1½ power pocket lens and began fishing around in space endeavoring to pick up the image of Mars on which I knew the big glass was set. I finally found it and holding my improvised ocular as steadily as I could observed its markings. The planet was receding and not too good for observation and the "seeing," Dr. Pease said, was not what it should be. But at an altitude of 6000 feet, looking into the world's largest telescope, secondary seeing and improvised ocular did little to mar the brilliance of the result.

Jupiter, which we later observed, offered more attraction however. What a difference in character was noted between the two cloud belts. The Great Red Spot was coming into view on the west, a lemon-shaped island in the belt, showing dark concentration at both ends. The northern belt resembled braided strands while the southern one appeared to be constructed of long flowing lines and bands. While few markings extended toward the southern pole, they were many and well defined far to the north. How minute we seemed sitting there in the dark, perched precariously on that sliver of steel. Dr. Pease, wrapped in a great fur coat and probably very comfortable, told me of the many improvements and adjustments he is making and planning to make in the mounting. I questioned and listened, there in the still, dark coldness of the dome, while trying to keep my teeth from rattling. Despite the inevitable chill, I found the experience as thrilling as all must who look for the first time into the Hooker telescope.

Later in the evening we crossed to the dome of the 60-inch. The last of the curious crowd had departed and Mr. Hoge, his labors over for

the night, was lighting a big cigar for which he evidently was very hungry. A man of middle age, middle stature, with iron-gray hair and alive with enthusiasm, he seemed proud of his position as master of ceremonies. Here he told us of his work and how he had come to relinquish his job as agent for the Santa Fe railroad, 27 years before, to join the staff of the observatory. Shortly after the institution was established he had been sent by the railroad to consult with Dr. Hale regarding the transportation of 45 astronomers from the east. These included many foreigners and all were bound for Mt. Wilson to attend a meeting of the Solar Union. At Dr. Hale's suggestion Mr. Hoge was placed in personal charge of the expedition. Some years later, in 1912, Mr. Hoge was offered the post of night assistant on the mountain and accepted it. Far back in his early railroading days he had started to make an 8-inch mirror and this was finished only in 1905, after the railroad had transferred him from San Diego to Pasadena. At this latter date he had written to Uncle John Brashear for an eyepiece and that good angel had sent him *three*. Still later he had reported variable star observations to Harvard Observatory, but all before he had abandoned railroading for astronomy. For years he kept the "Log" on the mountain, recording the work at the instruments, night after night, by the staff in those earlier years. What stories he can tell of those days, incidents of scientific and social interest. And what a mine of material bearing on the lives of men now famous in science, must be hidden between the covers of those old "Logs."

At last, escorted by Mr. Hoge with his torch, we started back for the inn. Lights are, of course, taboo about the grounds and I would defy anyone not familiar with the ever twisting road to find his way in that Stygian darkness. Mr. Hoge conducted us, however, in safety, not only to the inn but far beyond it to the west where roads and paths cease. We there wound through trees and underbrush in the pitch blackness, on and on, until suddenly we stood upon the brink of an abyss. The stars gleamed overhead and a mile below our feet millions of other stars covered the broad valley. We knew, of course, that we must be standing on Signal Rock, the most westerly promontory of the reservation. Seemingly at our feet but over a mile below us lay Pasadena whose lights marked and made brilliant its long boulevards and countless cross streets. Far away to the southwest lay Los Angeles across whose vast area the distant lights merged and shimmered in a cloth of gold that stretched to the shore of the Pacific ocean. It is said that the lights of 60 towns blend in the panorama presented from this vantage point. Many have seen and admired the splendid photograph of this scene taken by our friend Mr. Hickox. But unless they have stood on Signal Rock at midnight, under a brilliant, moonless sky, and gazed across that glowing valley, they have missed one of the most thrilling pictures in all the Book of Nature.

All next morning was spent wandering about the eastern end of the

reservation, scrambling from one jutting crag to another, all overlooking the valley in the direction of the High Sierras. Echo Rock is a famous objective from which to view the mountains, their faces scarred with long brown fire-trails, for it extends far out over the valley and is reached only by a narrow path along a ledge from which projects an occasional fir tree.

Mr. Dan Tracy, forest ranger, charged with safeguarding the reservation from fire, gentleman, photographer, and friend and frequent host to the mountain observers, had invited us to his cabin for afternoon tea. To the east of the 100-inch and not far from Echo Rock are his quarters, and there, in the soft afternoon sun-light, we were ushered into camp by our handsome, slender host, there to meet the smiling Mr. Hickox and young Dr. N. U. Mayall. The latter was a tall, attractive youth who at the time was working for his degree from Berkeley and proving himself of real value to the Mt. Wilson astronomers. Our versatile host was his own cook, butler, and scullery-maid and the tea and cinnamon-topped English muffins which he prepared for us were excellent. He and Mr. Hickox showed us the pictures they had recently made during a trip through Death Valley and seldom have I seen such splendid examples of photography. As we left the camp we came upon some tall yuccas whose swollen stems promised soon a burst of bloom. I photographed one of these at 5:00 o'clock and measured its height. Next day I returned at noon and found that it had grown 9 inches in 19 hours.

We were back at the inn well before supper time and there had the pleasure of meeting Mr. Max Adler of Chicago who, with his wife and daughter, had arrived on the mountain late in the afternoon. It was their first visit to Mt. Wilson and they sat about the fire vigorously discussing the hazard of the trip up the mountain and dreading the return. The conversation was occasionally interrupted by music from the radio in the next room, inviting comments from Mrs. Adler that indicated a high degree of musical appreciation. Mr. Adler, gray-haired, well built and hearty, discussed his great hobby, the Chicago Planetarium, which he has built and endowed. He told proudly of the things for which, he declared, he was most thankful: The site and the architect of the Planetarium; the securing of Professor Philip Fox as its Director; and the set of ancient instruments which, as a complete collection, Professor Fox had obtained from Holland. Mr. and Mrs. Adler gave us a cordial invitation to visit them in Chicago upon our return east, even promising us a private showing of the Planetarium. Surely this was a treat to anticipate, but unfortunately one that we were forced to forego.

Dr. Mayall had invited me to meet him in the evening at the 60-inch telescope, the instrument completed by Professor Ritchey in 1908 and which this great artisan always felt to be his masterpiece. And how he loved it! With it he made those pictures of celestial objects which

stand today the most nearly perfect things of their kind. Many enlargements of these photographs Professor Ritchey had shown me in Paris. There also Professor Henri Chretien had told me of his visit to Pasadena in 1910, I think it was, during the early part of the work on the 100-inch mirror. He did *not* tell me, however, the story of his attempt to learn the art of guiding the 60-inch telescope: Professor Ritchey had agreed to instruct him and after numerous explanations and trials inserted a plate-holder. With the guide-star in position, Professor Chretien, as excited as he was serious, began the tedious and exacting work of guiding. At the expiration of three-quarters of an hour, exhausted but elated, the Professor demanded that the plate be developed at once that he might see the result of his premier effort. One

Mr. Joseph O. Hickox and Dr. N. U. Mayall (*Right*).

can imagine the murderous thoughts that passed through the head of our little French friend when Professor Ritchey informed him that the holder contained no plate and that he had but executed one more step in the practice process of learning to guide a big telescope in the exacting Ritchey manner. That the little man forgave the big one in time is evidenced by the fact that years later the product of their combined talents gave to astronomy the Ritchey-Chretien type of telescope, the first large-scale example of which is now being completed for the Naval Observatory in Washington.

When I arrived at the 60-inch, the telescope had been set upon a region, if I remember rightly, in 8 hours right ascension and 19 degrees southern declination and Dr. Mayall, who was awaiting me on the observing platform, was preparing to photograph a remarkable variable star whose period was reported to be about one and a half hours. Using a 4x5-inch panchromatic plate, he had planned to make a series of 9 exposures, of 10 minutes each, of the stars in the field, thus hoping to

catch the entire period on a single plate.

"Art" Wright, the stocky custodian of the 60-inch, secured from somewhere a heavy blanket to protect me from the cold night air and thus equipped, high on the platform, I watched operations at close hand. Some adjustment of the guiding telescope was required to begin with, and making a feeble attempt to aid Dr. Mayall with this I several times dropped a screw-driver, he had given me to hold, into the black void below, making it necessary for the patient "Art" to retrieve it. What long-suffering chaps those earnest night workers are! Though the program was carefully carried through when the plate was later developed it was obvious that our attempt to correct the defect in the guiding glass had proven unsuccessful for it was impossible to identify the star we were after. Later in the year I came across a press article which read in part as follows: ". . . this newest flicker star, described in a recent note to the Astronomical Society of the Pacific by N. U. Mayall of Mt. Wilson Observatory, grows brighter and dimmer at intervals of less than an hour, a complete cycle lasting about an hour and forty minutes." No doubt it was Dr. Mayall's first attempt to photograph this object that I had had the fun of witnessing. I have often wondered since to just what extent my awkward presence may have contributed to the failure of that initial attempt. The succeeding operation, however, was far from futile. The glass was directed toward the now famous region in Coma-Virgo where Dr. Shapley has found those "Galaxies of Galaxies" to be seemingly swarming.

The 7-inch Ross condenser was adjusted in its cell in front of the 6x8-inch plate-holder and prior to the required exposure of one hour I enjoyed watching the method of "knife-edge" focusing. In the small hours of the morning Dr. Mayall developed the plate in the dark-room under the floor of the 60-inch, and after fixation allowed me to examine it. There, caught in the emulsion, I counted 40 spiral nebulae. Some just fuzzy spots little larger than star discs. Very many, however, were perhaps an eighth of an inch in diameter, showing brilliantly sharp under the power of my pocket magnifier. Some appeared "full on" and showed clearly the double spiral arms. Others were at varying degrees of obliquity, but all were unmistakably "Island Universes" brought to us from those inconceivably remote regions of outer darkness by the magic of that servant of science resting on its bed of concrete above our heads.

It was while this plate was being exposed that I visited the little building wherein is served the midnight lunch, and there found Dr. Pease who asked me to join him in the discussion of some fried eggs which Tom Nelson was just then turning on the oil stove in the corner. It was this big, quiet Tom, lean and husky, who had years ago driven the truck containing the section of structural tubing for the 100-inch up the Mt. Wilson trail, and when the outer wheels had started to settle and the immense load had careened perilously over the abyss, he had clung to his post. A tilt of a few inches more and his body would have

been found at the foot of the mountain beside the tangled wreckage of the great tube. But he had kept his head and so was here now fussing over fried eggs. But it was more than the eggs that Dr. Pease and I discussed over the top of the broad table that night. For an hour or more I listened to his tales of early days and experiences on the mountain, of the making of the 100-inch, the hopes and fears of those years between 1910 and 1917, of incident and adventure, tales told in his deep voice and spiced with a sort of grim humor. How I reached my cabin after leaving Dr. Mayall at a still later hour, remains a mystery. I had no torch and the blackness was as thick as tar. I *felt* my way back over that quarter mile, by some instinct avoiding stepping off into space. And once in bed it took a lot of blankets a long time to thaw me out.

The next day was to be our last on the mountain and Mr. Hickox had planned to show us much that we had not yet seen. We first visited the 6-inch refractor in its little house near the 150-foot tower. Here an interesting creation of Dr. Pettit's was engaged in its rhythmic job of correlating the sun-spot curve with that of radiation. The sun's rays passing through the telescope fell alternately upon green and gold covered glass discs, allowing the light to pass through each of these at minute intervals, while a clever recording device checked the amount of green and violet light thus received. Dr. Pettit has a similar instrument operating at the Desert Laboratory in Arizona. After seven years observation the sun-spot curve is found to be in remarkable accord with that of radiation. From the 6-inch dome we walked across the sloping field to the tower of the 60-foot telescope, erected in 1907. Here were revealed many things that would appeal strongly to the amateur because their significance could be more readily grasped. At varying focal lengths the lenses of the 60-foot instrument cast images of the sun either 7 inches or 2 inches in diameter. The former through a 12-inch lens with a focal length of 60 feet and the latter through a 4-inch lens having a focal length of 18 feet. It is with the smaller of these images that the spectroheliograph, that wonderful instrument developed in its modern form by Dr. Hale from 1924 to 1929, is employed.

Upon a photographic plate measuring about 3x12 inches, a direct photograph of the sun is first made, and this is followed by three spectroheliograms of the solar disc. The latter are made with the light of one element, that of the Hα line of the spectrum being most frequently used. Thus sun-spot areas or those of other interesting features on the photograph may be directly compared with similar areas on the monochromatic images. Upon some of the plates an obscuring disc had been interposed exactly covering the sun's image, and upon these one saw the prominences as clearly as they might be observed during a total solar eclipse.

Nothing could be more startling than the *changes* noted in the form and extent of certain of these prominences as shown upon one plate alone, whereon the spectroheliograms had been made at five minute in-

tervals. Grotesque sheets of flame extending 200,000 miles from the sun's limb showed remarkable variations on the three images. The distinct and detailed contour of a prominence on one image, differing widely in form and size from that on either of the others. A fixed program of such observations gives a graphic history of the turbulent changes occurring at the limb of the sun. Nearby stood the more recently developed spectrohelioscope, in the improvement and simplification of which Dr. Hale has taken great pride. Various schemes have hitherto been used for effecting persistence of vision. Either the slit or the sun's image having been moved rapidly and smoothly back and forth in order to give the observer a complete, visual, monochromatic picture of the sun's disc. The instrument at hand, however, had been fitted with that clever device conceived by Dr. John A. Anderson, consisting of a square pencil of quartz about two inches long, being in effect a double prism. This was mounted horizontally above the slit and made to revolve rapidly by a motor belted to a wheel at one end of its axis. Through an ocular just above it, one observed the light which passed from the slit through this revolving double prism. The effect was a complete "motion picture" of the sun, and by placing a disc over the sun's image, the constantly changing prominences could be viewed uninterruptedly.

It wasn't at all easy to leave these fascinating things but our time was limited. We next visited the house of the 100-inch telescope nearby. This instrument is a short focus refractor used for photographing sky areas about 15 degrees square on every large plates. In this regard it reminded me of the Lawrence Lowell search telescope at the Lowell Observatory. In one corner of the room stood a case, still unopened, which I was informed contained a machine just built at the Pasadena shops. This was familiarly referred to as the "jiggle instrument" and was intended for use with the 10-inch telescope. When in operation it actuates the plate-holder in four directions making square images of the objects being photographed, presumably for more ready comparison of the nebulae with the stars by means of their integrated light.

Leaving the 10-inch dome we proceeded by a narrow path down the southern side of the hill to the building containing the magnetometer. There in an otherwise wholly darkened room, a thin pencil of artificial light falls upon a minute mirror attached to a suspended thread of quartz, held taut by a metal weight at the bottom. Near the source of the light beam is a slowly revolving, horizontal cylinder covered with sensitized paper, which catches the point of light reflected from the mirror. The weight will vary its position with changes in the character of the earth's magnetic currents and the tiny mirror, moving with it, will record these changes, photographically, upon the revolving scroll. A record is thus kept of the variations in the earth's magnetic intensity, with which comparisons may be made of the times of sun-spot appearances and activities. There are certain observed lags between these phenomena which require much study before a reasonable correlation

may be determined. Just under the eaves, above the outer door of this small, light gray building, a splotch of black paint stains a few inches of clapboard. Not long before our visit, Mr. Hickox was showing Dr. Harlan Stetson around the mountain. As they were about to enter this magnetometer building, Hickox explained that the interior was completely dark. Glancing at the black stain above the door, Dr. Stetson remarked dryly, "Yes, I see that some of it is leaking out."

Farther down the hill, on the extreme southern edge of the reservation, overlooking the valley far below, stands the "Monastery," the cosy, club-like home used by the astronomers during their sojourn upon the mountain. The approaching road passes through a broad gateway into an entrance court facing a group of buildings, the main one of which contains the large library and living room. At the western side of the entrance court and at right angles to the library extends the row of single sleeping rooms for the members of the staff. Beside the usual bedroom furnishings each of these is equipped with desk and radio and each is ready to house its occupant upon his periodic visit there. Housekeeper, cook, and helpers, of course, live here continually. The ample library, whose windows look out over the valley at the south, is lined with low shelves of books against its picture-covered walls. Bound volumes of historic interest contain the photographic portrayal of the progress of events upon the mountain, showing the processes of construction of each instrument and building as one after the other came into being.

Here were also huge scrap-books containing clippings from the press pertaining directly to the work of Mt. Wilson men. An open fire-place at one end of the library invites those returning from the cold domes to draw their leather-covered chairs close to its cheering blaze. What discussions must inevitably take place at such times, arguments that have to do with fantastic nebulae and fleeting worlds, among those watchers of the skies in this cosmic "Explorer's Club."

We began the descent of the mountain upon a late afternoon bus. Dr. Mayall was with us, together with a score of holiday sight-seers. Soon we were to visit the headquarters and laboratories of this splendid organization in Pasadena and there meet many of the men who contribute toward making the Mt. Wilson Observatory the great institution it is. As we rounded the corner of the inn we saw a figure in a reddish-brown flannel shirt, his freckled face smiling broadly as he raised his arm in farewell.

It was our last view of the genial Hickox.

East Orange, New Jersey, November 5, 1932.

Harold Jacoby
1865-1932

By WALLACE J. ECKERT

Professor Harold Jacoby, retired head of the Astronomy Department at Columbia University, died on July 20, 1932. Because of his extended period of service he will long be remembered by alumni and faculty of Columbia University, as well as professional and amateur astronomers, and many personal friends.

He was connected with Columbia University since 1881, first as a student and later as a teacher. He received from that institution the A.B. degree in 1885 and the Ph.D. degree in 1896. His active teaching service extended from 1885, when he was appointed Fellow in Astronomy, until he retired because of illness in March, 1929. During that time he took a keen interest in the affairs of the University and in his students. He taught Astronomy, Geodesy, and Navigation to several thousand students, many of whom look back upon their courses with him as the outstanding ones of their college careers.

Among professional astronomers, Professor Jacoby's name is associated principally with the early determination of accurate star positions from the measurement of photographic plates. The great collection of photographic plates taken by Lewis Morris Rutherford had been given to Columbia University, and the measurement and reduction of many of these was done by Professor Jacoby or under his direction. He was a member of the American Eclipse expedition to Cape Ledo in 1890, and on the return voyage he stopped at the Cape of Good Hope where he spent several months as a voluntary assistant to Sir David Gill. Here he took part in the triangulation of the comparison stars for the determination of solar parallax from heliometric observations at Victoria. Among his other researches might be mentioned his observations and reductions for the variation in latitude, and the investigation of the effect of optical distortions of the objective on photographic measurements. He was also one of the founders of the Mathematical Society of New York which later became the American Mathematical Society.

Professor Jacoby was admired by amateur astronomers for his popular lectures and writings, and for his constant willingness to answer questions. His public lectures were attended by large and enthusiastic audiences and his popular articles, which were syndicated throughout the country, were noted for the same simplicity and clarity as his lectures. Also his college textbook in astronomy was so clearly written that it was widely read by laymen.

He was born March 4, 1865, in New York City, and with the exception of two years spent on the eclipse expedition to West Africa, and at the Cape of Good Hope, lived most of his life in New York City.

While at the Cape of Good Hope, he married Annie Maclear, daughter of George Maclear, chief assistant at the Cape Observatory and granddaughter of Sir Thomas Maclear, who was for many years His Majesty's Astronomer at the Cape of Good Hope.

From the time of his retirement until his death he lived at Westport, Connecticut. He is survived by his wife, his son Maclear Jacoby, his daughter Eve Jacoby Van de Water, and two grandchildren.

COLUMBIA UNIVERSITY, NEW YORK CITY, NOVEMBER 10, 1932.

Occultation of Pleiades Stars on December 10-11, 1932

By DIRK BROUWER

During the night of December 10-11, 1932, the Moon will occult a number of stars in the Pleiades. It will be the second time during the year that occultations of Pleiades stars are well observable in the United States. The other occasion was on February 14-15.

Unfortunately, December 10-11 will be only two days before Full Moon. Consequently, the fainter stars may be difficult to observe with small telescopes of short focal length, but many observers will be able to observe the disappearances of a number of fainter stars in addition to the stars for which the predictions were furnished by the *American Nautical Almanac* Office.

The occultations are visible throughout the United States. The local times vary from about three hours before local midnight for the Pacific Coast to about two hours after local midnight for the Atlantic Coast.

The diagram represents the brighter star in the Pleiades. The numbers or letters are those assigned by Bessel. In the two tables the magnitudes of the stars are given and also the Flamsteed or Bode numbers corresponding to the Bessel numbers of some of the stars.

MAGNITUDES OF PLEIADES STARS.

Bessel's No.	Magn.	Bessel's No.	Magn.	Bessel's No.	Magn.	Bessel's No.	Magn.
g	6.5	1	7.0	19	7.5	f	4.0
b	4.7	8	8.0	20	8.0	h	6.2
m	6.3	9	8.1	21	8.6	30	8.4
e	5.0	d	4.5	22	7.0	31	8.0
1	8.2	10	8.0	23	8.0	32	7.5
2	8.8	11	9.1	24	7.0	33	7.8
3	9.0	12	7.5	η	3.0	34	7.2
4	8.1	13	8.5	25	8.2	35	9.2
5	9.1	14	9.0	26	9.0	36	8.5
6	9.0	15	8.5	27	8.5	37	7.9
c	4.8	17	7.9	28	7.0	38	7.5
7	8.2	18	8.0	29	7.8	39	7.7
k	7.0	p	8.0	s	7.0	40	7.3

TABLE FOR THE IDENTIFICATION OF SOME OF THE BRIGHTER PLEIADES STARS.

Flamsteed or Bode No.			Bessel No.		
16 Tauri	=	g	Pleiadum	=	Celaeno
17 "	=	b	"	=	Electra
18 "	=	m	"		
19 = q "	=	e	"	=	Taygeta
20 "	=	c	"	=	Maia
21 "	=	k	"	=	Asterope
22 "	=	l	"		
23 "	=	d	"	=	Merope
24 "	=	p	"		
25 = η "	=	η	"	=	Alcyone
104B "	=	28	"		
105B "	=	29	"		
26 "	=	s	"		
27 "	=	f	"	=	Atlas
28 "	=	h	"	=	Pleione

YALE UNIVERSITY OBSERVATORY, NEW HAVEN, CONNECTICUT.

The Adler Planetarium and Astronomical Museum of Chicago

By PHILIP FOX, *Director*

THE ASTRONOMICAL MUSEUM.

[*Continued from page 549*]

Telescopes. The telescope is the most important instrument of astronomy. Its origin is obscure. It would seem that Roger Bacon

(1214-1292) must have seen a telescope either at home or abroad, or have made one, for he wrote:[19] "Glasses or diaphanous bodies may be so formed that the most remote objects may appear just at hand . . . that we may read the smallest letters at an incredible distance." Also, there can be little doubt that Leonard Digges in 1550 or thereabouts, after study of Bacon, made "perspective glasses" wherewith he was able "to discover every particularité in the countrey rounde about." It is of interest to read that Thomas Harriot (1560-1621) mathematician and philosopher, "tutor of Sir Walter Raleigh and correspondent of Kepler," used a "perspective glass" in Virginia when he accompanied Sir Richard Grenville's expedition in 1585. Digges, who died in 1570 and who has already been cited as the maker of the theodolite, may have made reflectors as well, for this use of concave mirrors is revealed in writings of the time. The Dutch claimants to the invention of the telescope, Hans Lippershey, Zacharias Jansen, and James Metius, date from 1608. The serious use of the telescope in astronomical observation must be ascribed to Galileo who in 1610 made the first great telescopic discovery, the four brightest moons of Jupiter, an epoch-making event in the history of astronomy and of world history, an observation revolutionary in its effect on the course of human thought.

Forty-one telescopes were obtained in the Mensing Collection, of which five are reflectors. About a third of the refractors are incomplete, lacking either the objective or ocular. The reflectors, however, are complete, ready for use. For the most part the refractors are constructed with a series of draw tubes. The materials of the tubes are wood, metal, ivory, or paper; the latter in general being covered with parchment or leather finished plain, shagreen, or beautifully tooled. The makers of some of the telescopes are immediately ascertainable by signatures engraved on the tubes, for example:

A.M. 422 Initials "A. G." (c. 1650) Focal-length, 1.18 m.

A.M. 424 "John Marshall, Lutgat Street: London" (c. 1680) F, 2.98 m.

A.M. 434 "Passemant Rue de la Monnoye A La Pomme Dor A Paris." (c. 1740) F, 1.7 m.

Others have names etched on the objectives, a practice which should be adopted by modern opticians:

A.M. 426 "Pierro Patroni in Milano," (c. 1660) F, 2.07 m.

A.M. 431 "Francus Baillon fec. Mediolani (Milano) 1738" F, 1.70 m.

A.M. 442 "George Lepere, Quai de l'Horloge du Palais 1744"

The group of telescopes in Fig. 45 has, at the top, replicas of the first telescopes of Galileo. The originals are in the Tribuna di Galileo in

[19] Bacon, Epist. ad Parisiensem.

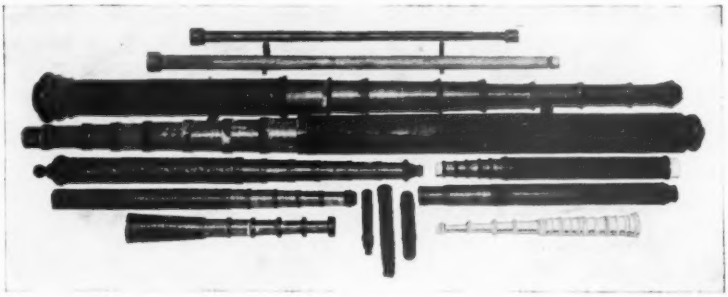


FIG. 45. A GROUP OF OLD TELESCOPES.

Florence. The replicas were prepared by the Curator Giulio Cipriani of that city. The two great telescopes just below, A.M. 428 A and 428, have focal lengths of 5 m and 5.75 m respectively, apertures 6.8 cm. One of them has been identified tentatively as a Campani. The telescopes of this optician won fame by the discovery with their use of the fifth and third and fourth satellites of Saturn, in the years 1672 and 1684.

The longer of the two telescopes below the Campani is A.M. 427. It is probably French though Mensing notes that the decoration suggests Torino. It is dark green Morocco, beautifully tooled with vignettes and lioncels in hundredfold repetition. It must have been made for a person of importance entitled to a coat-of-arms as indicated by the heraldic lioncels. Focal-length is 2.13 m. Its date is the latter part of the seventeenth century.

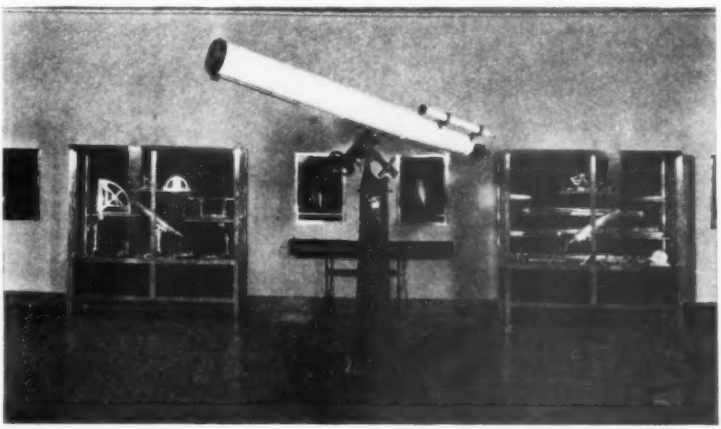


FIG. 46. SOUTH MUSEUM HALL WITH CABINETS OF TELESCOPES AND GEODETIC INSTRUMENTS, HERSCHEL'S 6-INCH TELESCOPE, AND MODERN REFRACTOR.

The conical telescope in the left foreground, A.M. 421, is one of the most important pieces in the entire Museum. Optically, it is of the Galilean type. The decoration places it in France at about 1630. It is one of the oldest intact telescopes in existence. The leather is beautifully tooled with gold figures of vines and flowers and birds. There are

Fig. 47. A.M. 435. A Reflector Probably Made for Louis XV.

five draw tubes; the aperture is 2.5 cm, the focal-length 69 cm.

The conical companion to the right, A.M. 423, is of ivory, most delicately carved. There are five draw tubes which permit an extension to 87 cm.

The cabinets for the display of the telescopes and certain geodetic instruments are shown in Fig. 46. In the center of the cabinet to the

right is a reflector of extraordinary beauty, A.M. 435, which is shown singly in Fig. 47. It is richly embossed in silver ornaments of the Zodiacal figures and acanthus leaves and fleur-de-lis, probably made for Louis XV (1710-1774). The aperture is 100 mm, the length of the tube 77.5 cm. The speculum is very bright. A practical test of the instrument shows very satisfactory performance.

Fig. 46 shows also two large telescopes—a modern 8-inch refractor with lens by Alvan Clark & Sons, with a modern equatorial mounting by William Gaertner, a loan from the President of the Chicago Astronomical Society, the distinguished architect, Mr. Richard E. Schmidt; and in the background one of the chief prizes of the Museum, a 6-inch reflector by William Herschel. The latter is complete with speculum. This is a much appreciated gift from the British Admiralty through the kind offices of the Astronomer Royal, Sir Frank Dyson. During the meetings of the American Astronomical Society in September 1930 no piece in the museum received more eager attention.

The Museum has a 4-inch Steinheil, gift of Mr. Oscar G. Mayer; a 5-inch Mellish; a 3-inch Vion; a 4-inch Mogey, and a 4-inch Zeiss, loaned respectively by Mr. H. S. Rich and by Carl Zeiss Inc. These may be carried into the open on the upper terrace for observation of the sky.

The Museum contains also the mounting and tube of Burnham's famous 6-inch refractor and the original mounting of the 18½-inch refractor of the Dearborn Observatory. These two items are of especial interest in Chicago. With the 6-inch, Burnham began his productive labors on double stars in Chicago, discovering 451 pairs with its use. This is loaned to the Museum by the Washburn Observatory of the University of Wisconsin. The 18½-inch Clark refractor erected in Chicago in 1865 on the campus of the original University of Chicago in Douglass Park and later transferred to Northwestern University in Evanston, was from its erection until 1876 the greatest refractor in the world. Truman Henry Safford, S. W. Burnham, Elias Colbert, G. W. Hough, and the writer, as successive directors of the observatory, used this telescope in its original form. It was given a new Warner & Swasey mounting in 1912. The old mounting is a gift of the Chicago Astronomical Society.

The discussion of telescopes cannot be concluded without mention of the model of an observatory, shown in Fig. 9; the model of the top of Mount Wilson; the Meridian Circle of the Harvard College Observatory here on loan; and the coelostat and vertical telescope which bring a solar image into the corridor to the spectrohelioscope. The observatory model is based on the U. S. Naval Observatory in Washington, D. C., with the offices omitted, a building of excellent architectural design by R. M. Hunt. The model has a rotating dome, rising floor, and moving telescope. With one pressure of a button the dome moves, the telescope swings to a pointing in the slit, and the floor comes to proper

adjustment. The dome is transparent so that the operation can be seen from all sides. The model of the top of Mt. Wilson with the many telescopes, laboratories, etc., constructed by Mr. Ferdinand Ellerman, is on loan from the Carnegie Institution of Washington. Its dimensions are 36x70x16 inches.

The meridian circle is being set up on the lower floor and will be directed to a moving artificial sky. A chronograph, gift of the U. S. Navy, will be used with it to show the method of recording time.

FIG. 48. COELOSTAT ON THE UPPER TERRACE.
Left to Right: Fox, Miller, Dugan, Brown, Schalen. Miss Cannon, Stewart.
Meeting American Astronomical Society, September 1930.

The coelostat and vertical telescope by William Gaertner is on the upper terrace (Fig. 48). Its mirrors are of pyrex. They throw the sunlight to a 6-inch lens of 20 feet focal-length of the vertical telescope. Used with the spectrohelioscope it is the one instrument of primary research of the institution.

A Foucault Pendulum of the Longdon design; apparatus for showing precessional motion, conservation of angular momentum; spectroscopes for demonstration of the various principles of spectroscopy; a large grinding machine, gift of Carl Zeiss, Jena, in operation in the museum corridors,—show the scope of the general exhibits.

Mementoes of two astronomers of the last generation whose characters and careers were such that they shall be legendary, attract appreciative attention, like that accorded to Herschel's telescope. Few men of science have caught the popular fancy and at the same time the

admiration of scholars in measure comparable to the two great astronomers who for so many years worked side by side at the Lick Observatory and later at the Yerkes Observatory, Sherburne Wesley Burnham and Edward Emerson Barnard—so alike in their unswerving devotion to observing, to whom a clear sky and a telescope meant opportunity and obligation. Burnham, excelling in everything he undertook, an expert rifle shot, artistic photographer, a speed stenographer, a figure of international renown in science while still employed as a clerk in the Federal Court, modest in all things, charitable but despising sham, a rare friend to many people, keen of vision, orderly in his routine as the stars themselves, working swiftly with economy of time, devoting his attention almost exclusively to double stars, accomplishing in observing and in the compilation of his General Catalogue of Double Stars one of the greatest pieces of work in practical astronomy the world has seen. Barnard, who entered astronomy by way of a photographic apprenticeship, worked through hardship and poverty to rank as one of the greatest observers of all time, who built a house with prize money awarded for discovery of comets, whose eye first saw the fifth satellite of Jupiter, whose interest covered all phases of observing visual and photographic, of childlike simplicity and enthusiasm, with will of steel to hold his vigil through bitter cold.

Burnham's sons and daughters have deposited here his barometer, protractor, planimeter, an arithmograph which he designed and which was made by E. Kandler & Co. of Chicago, a circular slide-rule which he computed and which was built by Warner & Swasey at Cleveland, Ohio, a daguerreotype of him and his sister when he was sixteen years old, a miniature as he was in his eighty-first year, a gold medal received as a photographic award, and his gold medal from the Royal Astronomical Society, the great manuscript copies of his Catalogue of Double Stars. Mention has been made elsewhere of the tube of his 6-inch telescope.

The Yerkes Observatory of the University of Chicago has loaned for exhibition nine medals awarded to Edward Emerson Barnard for astronomical discoveries: Three bronze medals, the Donohoe Medal of the Astronomical Society of the Pacific for the discovery of Comets, 29 March 1881, 2 October 1891, and 12 October 1892; three gold medals from the Institut de France, Academie des Sciences,—Prix Lalande, 1892, Medaille Arago, 1893, Prix Janssen 1900; Gold Medal of the Royal Astronomical Society 1897; Prix J. Janssen, Societe Astronomique de France 1906; Catherine Wolfe Bruce Gold Medal of the Astronomical Society of the Pacific 1917.

The Yerkes Observatory of the University of Chicago has loaned also the radiometer built by Ernest Fox Nichols and used by him at the Yerkes Observatory in the first detection of the heat of the stars. With a similar instrument, in collaboration with Gordon Ferrie Hull, he later detected the pressure of light.

It is customary in some countries to strike medals in recognition of notable scholarly achievements or as award for attainments. The cabinet holding Burnham's and Barnard's medals contains also a collection of medals principally from the French national collection. Among them—Newton—Law of Universal Gravitation; Leverrier—Discovery of Neptune; Cassini—Foundation of the Paris Observatory; Franklin—Lightning from the Clouds; Janssen-Lockyer—Observation of Solar Prominences with Spectroscope; Hind-Luther-Goldschmidt—Discovery One Hundredth Asteroid; Measures of Meridian Arcs, Ecuador and Labrador; large portrait medallion of François Arago (1786-1853), French astronomer, geodesist, physicist, academician.

Meteorites have an appropriate place in an astronomical museum. They are the only heavenly bodies which can be put on exhibition in tangible form. Mr. Moise Dreyfus of Chicago has presented a small stony meteorite to our cabinets. No attempt has been made to assemble further specimens, for the neighboring Field Museum has a superb collection and effort for the study of these bodies might be spent more profitably toward the enrichment of that collection than in beginning a new one.

Library. As part of his original gift, Mr. Adler presented about two hundred books, a nucleus for an astronomical reference library. To these have been added about 500 volumes by gift. So far as purchases are concerned, the primary effort has been toward the acquisition of books on old instruments and their uses, such books for example as:

Apianus—Instrument Buch—Ingolstad 1533
Cosimo Bartoli—Del Modo di Misurare, Veneti 1614
Valer. Regnartius—Astrolabiorum—Bononia 1610
Mallet—La Geometrie Pratique—Paris 1702
Bion—Instrumens Mathematique—Paris 1725
Eg. Danti—Astrolabio—Fiorenza 1569.

In the last it is interesting to see in the introductory pages two poems by a member of the Strozzi family, Giouambatista Strozzi il Gionine (1551-1634).

"Spirto divin ch'ergendo el Cielo il volto, . . ."

Of gifts, the principal ones are: from Mr. G. H. Jones of Chicago 327 volumes from the library of Professor Elias Colbert including sets of Galileo, Kepler, Laplace, many old works, Manilius, Euler. From Mrs. George H. Mason, daughter of Professor Colbert, the "Phaenomena" of Aratus, 1589. From Mrs. W. O. Beal and sons 59 volumes from the library of Professor Beal including a set of Tisserand's "Traite de Mécanique Celeste"; British Astronomical Association, 25 volumes of their Journal; British Nautical Almanac Office, 15 volumes, 1920 to 1933; U. S. Nautical Almanac Office, 58 volumes, 1867 to 1933. Other donations to the library in the form of pictures, manuscripts, and books have been received from: N. J. Bowditch, F. E.

Brasch, H. C. Burnham, L. J. Comrie, C. R. Fowler, Morton Hague, George E. Hale, Harvard College Observatory, C. O. Lampland, Mrs. Isabel M. Lewis, Jacob Olson, Harry Oppenheimer, Mrs. Dorothea K. Roberts, Morris Schanoes, James B. Stokley, Ambrose Swasey, University of Michigan Observatory, Frank J. Vassar, Miss Caroline Wicker, W. H. Wright, Yale University Observatory, and the Yerkes Observatory.

Transparencies. Photography is the most powerful aid to the telescope in astronomical research, with the cumulative action of long exposures, the accuracy and permanency of delineation, the wide field of the portrait lens, the registration of analyzed light in the spectrograph, it has marvelously extended the boundaries of knowledge of the heavens. At the same time, it provides the most vivid means of portraying the results. Nowhere has the Chinese proverb "One picture is worth a thousand words" better exemplification than in astronomy. Of the various possibilities of photographic display, illuminated transparencies are the most accurate as well as the most brilliant.

Seventy-two large transparencies from the finest negatives made with the world's greatest telescopes are mounted in niches in the museum walls provided for this purpose in the design of the building. The short time allotted for the organization of the Museum restricted the selection of negatives to those of American observatories. Photographs from foreign observatories must be added. The North and South Museum Halls each contain eighteen transparencies, size 24x30 inches, the East Corridor, thirty-six of size 17½x24 inches.

Those of the South Hall are devoted to the Solar System, with distribution of subjects as follows: on the inner wall,[20] six of the Moon logically arranged, including an 8½-day, a 16-day, an 18-day Moon and three enlarged portions, the regions of Tycho, Archimedes, and Copernicus. On the outer wall: five of the Sun—two coronae, a direct photograph of the disk, a spectroheliogram in hydrogen and one in calcium; seven of comets—four of Morehouse' Comet, showing changes, one each of Halley's, Brook's, and 1910*a*.

In the East Corridor the Solar System subjects include six on sections of the solar disk, one disk and prominence, and three of prominences; nine of planets. In addition, there are two for the greatest telescopes of each type; two for their housings; one portrait; one of star trails; nine of clusters, novae, and nebulae; and two of stellar spectra.

The transparencies of the North Hall are devoted entirely to the Sidereal System. The six transparencies on the inner wall are of the Milky Way from negatives by Barnard and Ross. On the outer wall, seven are of galactic nebulae, three of spirals, and two of the Magellanic Clouds.

Immediately below each transparency there is a legend (see Fig. 46)

[20] See Fig. 2, p. 127, *Popular Astronomy*, March, 1932.

in transparency negative form, white letters on black field, which gives such explanatory material as can be included within the limits of the space, always including the name of the astronomer who took the photograph, the instrument, date, and exposure time where pertinent.

When the transparencies were made, a few extra were provided that some change of display could be made from time to time. The following observatories are represented:

Yerkes Observatory, 29 plates of Moon, Sun, comets, planets, nebulae, Milky Way, instruments.
Mount Wilson Observatory, 31 plates of the same classifications plus one of large scale stellar spectra.
Lowell Observatory, Plates of Halley's Comet and 1910*a*. Plates of Pluto, Mars, and Saturn.
Lick Observatory, Composite photographs of Jupiter.
Harvard College Observatory, Two plates of the Magellanic Clouds.
University of Michigan Observatory, One composite plate of representative stellar spectra.
Dearborn Observatory, One composite plate of Jupiter.

The transparencies from the Mt. Wilson and Lick Observatories were made by Mr. Ferdinand Ellerman of the Mt. Wilson Observatory, whose well-known photographic skill is sufficient guarantee of their quality. The Lowell Observatory transparencies were made at Flagstaff by members of the observatory staff. Extraordinary pains were taken in their preparation, especially the composite plate of Mars with fifteen exposures from as many negatives showing the seasonal variation of the polar cap. The transparencies from the Yerkes, Michigan, Harvard, and Dearborn Observatory negatives were made by Mr. Charles A. Crowell of Chicago. Taken as a whole these superb pictures tell with graphic emphasis the story of astronomy's view of the universe.

Here is a museum devoted to the noblest aspiration of man's mind, the understanding of the universe. Here he may let his mind grope outward into limitless space nor remain forever earthbound, shrinking the universe to his petty stature. Better be again a clod of clay of that Earth from which he came than never to have risen to the height from which the wide vision of creation may be obtained and have felt that glorious exaltation of him who cried:

"Then felt I like some watcher of the Sky."

ADLER PLANETARIUM AND ASTRONOMICAL MUSEUM,
CHICAGO, ILLINOIS, 12 MAY 1932.[21]

[21] This date is the second anniversary of the opening of the Museum and Planetarium. In the two years the visitors number 1,242,172.

Please attach this to page 623 of Popular Astronomy for December, 1932.

Total Eclipse 1934 February 13-14

By JAMES ROBERTSON

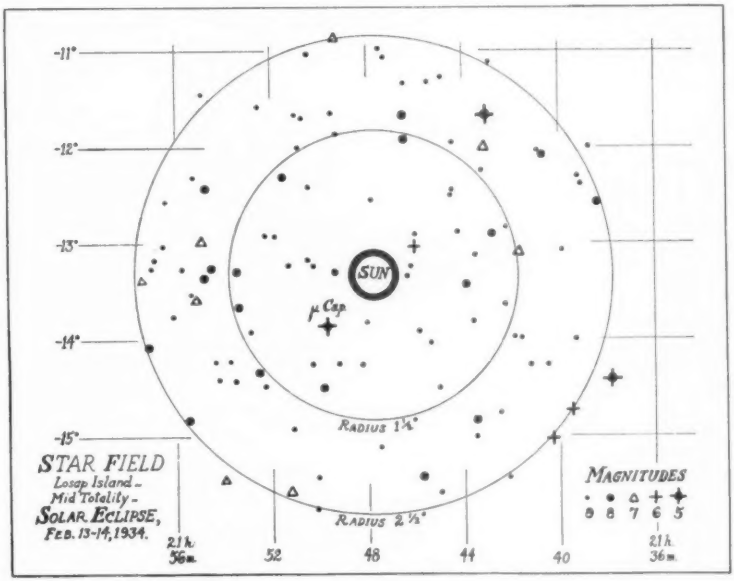
(Communicated by CAPTAIN J. F. HELLWEG, U. S. Navy, Superintendent)

On February 13-14, 1934, there will be a total eclipse of the Sun presenting several unusual circumstances, which will cause it to be looked forward to with more than usual interest by astronomers. There has not been an eclipse since that of May 28-29, 1919, that combines so many advantages for verifying certain phases of the Einstein Theory.

The chief advantage in observing this eclipse lies in the fact that the Sun will appear eclipsed in the centre of a group of stars, about one hundred of which, ranging from the fifth to the ninth magnitude, are within two and one-half degrees of the Sun's centre. The following star chart shows the position of these stars relative to that of the Sun's centre at the time of total phase:

Revised

THE POSITION OF THE SUN ON THE FORMER CHART IS INCORRECT.

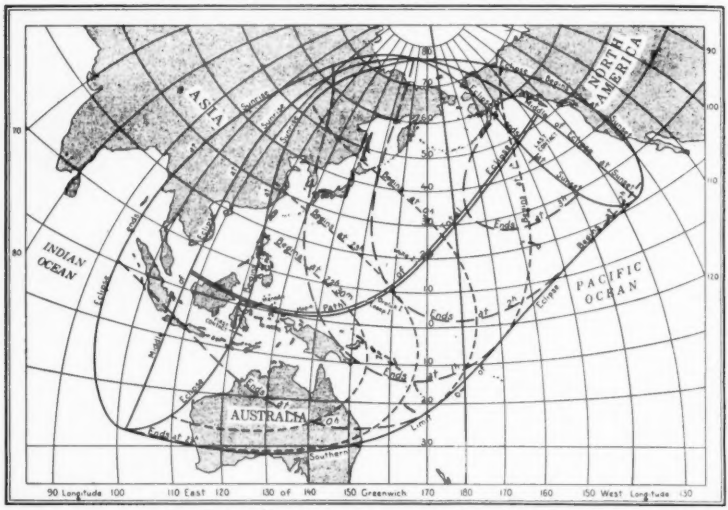


While the eclipse will be visible as a partial eclipse in general over

Please attach this to page 623 of Popular Astronomy for December, 1932.

eastern Asia, Australia, and the extreme western part of North America, these regions all remain so near the edge of the penumbra that the darkening effect will be scarcely noticeable. The only points of vantage for viewing this eclipse are a few small islands near the centre of the Pacific Ocean. This is evident from the map, if we bear in mind that the moon's shadow moves very rapidly near the beginning and ending of the eclipse, due to its being tangent to the earth at those points.

TOTAL ECLIPSE OF FEBRUARY 13-14, 1934.



Note - The hours of beginning and ending are expressed in Greenwich Civil Time.

The total phase will begin about 200 miles off the east coast of the Malay Peninsula. Following a course at first slightly south of east, then curving gradually towards the north it will pass over northern Borneo, the northern tip of Celebes and a few islands north of New Guinea. Then just before curving more sharply towards the north it will pass over two small groups of islands, which is the last land touched before it leaves the earth near the southern coast of Alaska.

Of these two groups, Losap and Orluk by name, Losap lies nearer the central line of totality and hence is the more desirable location for observation stations. At a point on Laol, one of the Losap group, longitude 152° 43′ east and 6° 54′ north, the duration of totality will be $2^m\ 5^s$.

These islands are located on an atoll reef 5 miles in length, in a north-and-south direction, by 2 to 4 miles in breadth. The lagoon within them is a fine sheet of water, free from shoals and affording splendid anchorage for light, draft vessels.

The population is about 200. There is a trading station which adds to the convenience of the location.

From pilot charts, furnished by the Hydrographic Office, we find that the weather is usually clear in these regions during February. The prevailing winds are from the northeast, with a velocity of from 11 to 18 miles per hour.

Losap is only fifty miles southeast from Truk, which is the largest group in the Carolines and is the seat of government for the central islands.

The total phase, if viewed from these islands, will occur about 10 hours and 17 minutes local civil time. The altitude of the Sun will then be 55°. With the Sun so near the zenith the effect of refraction errors would be greatly reduced.

The circumstances of the eclipse are as follows:

CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Civil Time	Longitude from Greenwich	Latitude
	d h m	° ′	° ′
Eclipse begins	February 13 22 5.1	—120 45	— 6 35
Central eclipse begins	13 23 6.8	—107 50	+ 3 55
Central eclipse at local apparent noon	14 1 2.2	—168 2	+19 22
Central eclipse ends	14 2 9.5	+136 41	+52 26
Eclipse ends	14 3 11.3	+146 40	+42 19

Planet Notes for January, 1933

By CLIFFORD E. SMITH

The *Sun* will be moving northeast from the central part of Sagittarius to the central part of Capricornus. On January 3 the earth will be nearest the sun for the year. At that time its distance from the sun will be about 91.3 million miles. During the month this distance will increase about 200,000 miles. The position of the sun on the first and last day of the month will be, respectively: R.A. 18^h 44^m, Decl. —23° 4′; R.A. 20^h 53^m, Decl. —17° 34′.

The phenomena of the *Moon* will occur as follows:

First Quarter	Jan.	3	at 10 A.M.	C.S.T.
Full Moon		11	" 3 P.M.	"
Last Quarter		18	" 12 P.M.	"
New Moon		25	" 5 P.M.	"
Apogee		6	" 8 P.M.	"
Perigee		22	" 9 P.M.	"

Mercury will be moving with an apparent easterly motion from the southern part of Ophiuchus to the eastern part of Sagittarius. At the beginning of the month its distance from the earth will be about 110 million miles and its apparent diameter will be about $5\frac{3}{4}$ seconds of arc. During the month this distance will increase about 20 million miles, and its apparent diameter will decrease about one second of arc. At the beginning of the month Mercury will rise about an hour and a half before the sun, but, during the month, it gradually approaches superior conjunction which will occur early in February. On January 25 conjunction with the moon will occur (Mercury $1\frac{3}{4}$° N).

Venus, like Mercury, will be moving from southern Ophiuchus to the eastern part of Sagittarius. During the middle of the month it will rise about an hour and a half before the sun, and its distance from the earth will be about 140 million miles. The corresponding apparent diameter is about 11 seconds of arc. Conjunction with the moon will occur on January 24 (Venus 4½° N).

Mars will be in southern Leo, moving with an apparent easterly motion until January 22, when its apparent motion will become retrograde. Mars will be in a position favorable for observation during this period since it will be above the horizon most of the evening hours. At the end of the month it will rise about 9:00 P.M. Standard Time. At that time its distance from the earth will be about 72 million miles, and its corresponding apparent diameter will be about 12 seconds of arc. Conjunction with the moon will occur on January 16 (Mars 5° N).

Jupiter will be in southeastern Leo only a few degrees from Mars. During the middle of the month its distance from the earth will be about 450 million miles, and its apparent diameter will be about 38 seconds of arc. During the middle of the month Jupiter will be on the meridian about 4:00 A.M. Standard Time. Conjunction with the moon will occur on January 16 (Jupiter 3° N).

Saturn will not be of interest during this period since conjunction with the sun will occur on January 27.

Uranus will continue in eastern Pisces. During the middle of the month it will set about midnight since quadrature east of the sun will occur on January 10. Its distance from the earth will be about 1860 million miles, and its apparent diameter will be about 3½ seconds of arc. Uranus will be in conjunction with the moon twice during this period, once on January 4 and again on January 31 (Uranus about 4½° S).

Neptune will be in Leo. Its distance from the earth will be about 2.73 billion miles, and its apparent diameter will be about 2½ seconds of arc. During the middle of the month it will be on the meridian about 3:00 A.M. Standard Time. Conjunction with the moon will occur on January 15 (Neptune about 1° N).

Comet Notes

By G. VAN BIESBROECK

Since last month there have not been any further additions to the long list of comets found this year. A number of faint comets remain, however, under observation.

In the evening sky PERIODIC COMET KOPFF (1932 *e*) is being overtaken by the sun. The increasing distance from the sun as well as from the earth reduces the brightness: on November 19 the total brightness was estimated here as corresponding to that of a star of 14th magnitude. It appeared as a faint round coma some 3′ in diameter with a well condensed nucleus. It moves across the constellation of Capricornus (see eph. p. 582) and will be lost in the western twilight in December. This return will have been well observed since the comet, found already in May, has now been followed for nearly six months.

COMET 1932 *f* (NEWMAN) is also best seen in the evening although it remains above our horizon during the whole night on account of its high declination. The following ephemeris, taken from *Circular* 405 of the Copenhagen Observatory, shows the course through the constellation of Cygnus.

EPHEMERIS OF COMET 1932*f* (NEWMAN).

1932 0^h U.T.	α h m s	δ ° ′	—Distances from— Earth	Sun
Nov. 29	18 37 59	+50 15.6	1.797	1.862
Dec. 7	19 19 20	51 33.0		
15	20 3 40	52 16.9	1.831	1.966
23	20 49 4	52 21.4		
31	21 33 24	+51 47.6	1.943	2.084

On November 19 it showed nearly the same aspect as Kopff's Comet, the apparent diameter being, however, somewhat larger (5′) and the object about a magnitude brighter (13½). There was also a well-defined condensation in which most of the light was concentrated. The comet remains well placed for observations but on account of the increased distances it will lose in brightness. The minimum distance from the earth was passed at the end of November.

COMET 1932*h* (PELTIER-WHIPPLE) has faded more rapidly than was expected in the latter part of October. My estimations of brightness from plates taken with the 24-inch reflector run as follows: Oct. 22 = 13M.5, Oct. 27 = 14M.5, Nov. 2 = 15M, Nov. 5 = 16M. The tail which was last noticed on October 12 was not recorded after that date. In November the comet was reduced to a hardly measurable diffuse coma of about 1′ in diameter. Further observations are hardly to be expected so that the visibility has lasted three months. Although there will remain considerable uncertainty as to the precise length of the period, the elliptic character of the orbit of this comet is clearly established. Two new sets of elements have been published since last month. The first one, computed at Berkeley, is based on two normal places on August 10 and September 4 and an isolated measure on September 28 at the Lick Observatory (Jeffers). The second one by A. D. Maxwell (Ann Arbor) depends on three normal places on the dates August 11, September 9, and October 14.

	Anderson	Maxwell
Date of Perihelion	U.T. 1932 Sept. 1.86397	Sept. 1.85100
Perihelion to node	38° 28′ 31″.5	38° 28′ 0″.3
Longitude of node	344 30 30.1	344 30 54.5
Inclination	71 42 30.0	71 42 54.5
Perihelion distance	1.037170	1.037229
Eccentricity	0.975818	0.9769825
Period in years	281	302.5

PERIODIC COMETS 1932*l* (FAYE) and 1932*m* (BROOKS) will be found close together in Cetus, near the position given by the ephemerides on p. 548. On November 19 I estimated the magnitudes as 10½ and 13 respectively. Both comets show a well-defined nucleus and a short tail in the first quadrant; they have both passed their maximum brightness at this apparition and are expected to lose about a magnitude during the month of December.

PERIODIC COMET 1932*k* (BORRELLY) remains a morning object in December and passes from Coma Berenices into Canum Venaticorum (see ephemeris p. 490). The loss in brightness due to the increasing distance from the sun, from which the comet has been receding since August 27, is only partly compensated for by the reduction in distance from the earth which decreases for a couple of months more.

COMET 1932*g* (GEDDES) which was found in the southern hemisphere last summer is now emerging from the vicinity of the sun; by the end of December it rises four hours before the sun for observers on this side of the equator, who

then have the first opportunity to see this comet. The following elements have been computed by J. Bobone at Cordoba (Argentina):

ELEMENTS OF COMET 1932 *g*.

Date of perihelion	1932 Sept. 20.9717 U.T.
Perihelion to node	329° 29′ 36″.1
Longitude of node	215 8 27.3
Inclination	124 59 47.1
Perihelion distance	2.314073
Eccentricity	1.002567

The motion is retrograde and the orbit differs slightly from the parabola toward the hyperbolic side. The following ephemeris shows that the comet is moving northward in Libra and that the distance from the earth is decreasing more rapidly than the distance from the sun is increasing. The brightness may therefore remain almost constant for some time.

EPHEMERIS OF COMET 1932 *g*.

		α	δ	—Distance from—		
0^h U.T.		h m s	° ′	Earth	Sun	Mag.
1932 Dec.	8	14 56 25	−17 18.9	3.29	2.48	10.1
	16	15 1 31	15 52.9	3.23	2.51	10.1
	24	5 58	14 18.9	3.16	2.54	10.0
1933 Jan.	1	9 44	12 35.4	3.07	2.58	10.0
	9	12 32	10 39.5	2.97	2.62	10.0
	17	14 17	8 28.8	2.87	2.66	9.9
	25	15 14 47	− 6 0.6	2.75	2.71	9.9

The actual brightness will most likely be fainter than is indicated in the column of computed magnitudes.

Another object that now comes into good observing conditions is PERIODIC COMET SCHWASSMANN-WACHMANN (1925 II), which has been frequently mentioned on previous oppositions on account of its most unusual changes in brightness. The present opposition comes next February and will almost coincide with the aphelion of the comet. No comet has so far been seen at aphelion when its distance from the sun is the greatest possible. All known comets lose so much of their light before coming to that position that they are entirely invisible. But this one describes an orbit that differs less from a circle than does the orbit of the planet Mercury. The distance from the sun therefore undergoes only a small percent of change and hence the theoretical brightness of this exceptional object changes by less than a magnitude between perihelion and aphelion. The unexpectedly large variations that have actually been observed cannot be accounted for by the geometrical conditions; they are one of the most puzzling phenomena among comets. The following ephemeris by J. G. Behrens shows the slow apparent motion of this comet in the constellation of Leo:

	h m	° ′
Nov. 29	9 32.5	+16 16
Dec. 7	32.3	14
15	31.6	15
23	30.2	19
31	28.3	26

The recovery of COMET TEMPEL (1866 I) of the November meteors becomes questionable. It was not found near the most probable position (p. 494) but the prediction is subject to great uncertainty so that the search should be continued.

Williams Bay, Wisconsin, November 22, 1932.

Variable Stars

Monthly Report of the American Association of Variable Star Observers for October, 1932

The twenty-fifth annual meeting of the Association was held at Harvard Observatory, Cambridge, Massachusetts, on October 15. The usual night before Open Night had as its lecturer Dr. Donald H. Menzel, recently appointed to the scientific staff of the Harvard Observatory, who spoke on "The Sun, a Variable Star." The Saturday morning session, following a short business meeting, took the form of an Eclipse Symposium, members and invited guests recounting their experiences and exhibiting some remarkable photographs of the corona. Mr. L. J. Boss of Scituate, Rhode Island, showed an interesting moving picture reel of the eclipse.

The afternoon session was held at the Oak Ridge station of the Observatory, situated some 25 miles distant from Cambridge. Professor B. P. Gerasimovic of Kharkov, Russia, gave an interesting account of the progress of astronomy in his country, referring in particular to the part amateurs were playing. Following adjournment of the official meeting, the new Agassiz Cottage was formally dedicated and tea served at the invitation of Director and Mrs. Shapley. The usual banquet was held at Cambridge in the evening at which time members were addressed by Abbe Lemaitre, Dr. Shapley, Secretary Olcott, and others. Mr. Pickering exhibited some hundred or more slides taken at the Hood College meeting of the Association in May, and at the recent meeting of the International Astronomical Union in Cambridge.

Newly elected members to the Council are Messrs. Ingham, Jones, and Peltier. Miss L. B. Allen was re-elected. The following officers were chosen by the Council: Miss Harriet W. Bigelow, president; Dr. Harlow Shapley, first vice-president; Leslie C. Peltier, second vice-president; William Tyler Olcott, secretary; Percy W. Witherell, treasurer, and Leon Campbell, recorder.

On October 16, some fifty amateur astronomers, including ten active A.A.V.S.O. members, held a mid-western meeting at the Yerkes Observatory, presided over by second vice-president George Van Biesbroeck. This, the third meeting of the A.A.V.S.O. mid-western members held in the past ten years, appears to indicate that from now on such meetings will become an annual affair.

The annual summary for the year ending October 31 indicates a marked progress in the quantity, as well as in the quality, of the work of variable star observing. More than 33,000 observations have been contributed by nearly 100 observers. This means the largest number of observations secured in any one year since the formation of the association twenty-one years ago. Of the 33,000 observations, 21,000 were contributed by 10 observers. Of these ten, Peltier heads the list with slightly over 4,000 observations, Jones is a close second, and Lacchini comes third. Next in order are Ahnert of Germany, Chandra of India, Baldwin of Australia, and Ensor of South Africa. Although 73 per cent of the total number of observations were contributed by 15 observers, the value of the remaining 27 per cent by 80 observers is great. With the plans for better coordination of methodical observation, it is hoped that a better distribution of these many thousands of observations among the nearly 500 variable stars may be obtained during the coming year.

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.
Aug. 0 = J.D. 2426920; Sept. 0 = J.D. 2426951; Oct. 0 = J.D. 2426981.

J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.
V SCL			T CAS			U CAS			W CAS			U PSC			X CAS		
000339			001755			004047a			004958			011712			014958		
921[	13.3	Bl	980	12.0	Pt	961	9.2	FO	957	11.5	Bl	958	11.0	L	958	11.8	FO
949	13.3	En	988	12.5	Pt	961	9.4	Ko	960	11.4	Ko	974	11.7	Gy	960	11.7	Jo
S SCL			995	12.1	Wr	967	9.5	Me	968	11.7	Bl	976	11.8	Gy	965	12.2	Bn
001032			R AND			969	9.6	Jo	970	11.7	Ko	977	12.0	Br	969	12.2	Jo
921	9.6	Bl	001838			970	9.8	Sf	971	11.6	Bl	980	12.0	Pt	971	12.0	Jo
937	9.0	Bl	959	13.8	Ma	973	10.6	Bw	976	11.6	Ko	988	12.6	Pt	977	11.8	Bn
941	9.4	Ht	973[	14.2	Br	973	10.3	Ko	976	11.5	Bl	RZ PER			979	11.5	Jo
946	9.3	Ht	977	14.0	Br	975	10.4	Me	978	11.4	El	012350			980	11.5	Pt
947	9.4	En	984	14.2	Br	975	9.9	Sf	979	11.7	Bl	956	10.3	L	988	11.1	Pt
947	9.1	Bl	S TUC			976	9.7	Jo	980	11.6	Pt	970	10.1	Me	RR ARI		
977	7.4	Me	*001862*			979	9.6	Jo	988	11.7	Pt	983	10.5	Br	015023		
980	6.9	Pt	941	12.2	Ht	979	10.2	We	988	11.4	El	R PSC			973	5.6	Mc
X AND			946	11.8	Ht	980	10.4	Sf	U TUC			012502			978	5.8	Mc
001046			947	12.0	En	980	10.5	Pt	*005475*			954	8.5	Ah	981	6.0	Mc
961	12.5	FO	S CET			981	10.6	Ko	921	10.0	Ht	957	8.5	Ah	U PER		
973	12.8	Br	*001909*			988	11.1	Pt	927	9.3	Ht	957	7.8	Jo	015254		
984	13.4	Br	930	8.6	Pr	RW AND			937	7.6	Bl	976	8.1	Jo	949	8.1	Jo
T AND			949	8.2	Jo	004132			939	8.6	Ht	976	7.7	Gy	953	8.0	Jo
001726			953	8.2	Jo	973[	13.9	Br	941	8.6	Sl	976	8.5	We	954	8.5	Ah
949	8.2	Jo	956	8.5	Ch	988[	13.7	Pt	946	8.7	Ht	978	8.9	Mc	957	8.5	Ah
952	8.5	Th	957	8.0	Jo	V AND			947	9.1	Bl	980	8.6	Ah	958	8.2	FO
953	8.0	Jo	960	8.4	L	004435			948	8.6	En	980	8.2	Pt	961	8.0	FO
954	8.6	Th	960	8.7	El	956	13.0	L	Z CET			981	8.3	Br	968	7.9	Jo
956	8.4	Th	961	8.6	Ko	974	11.2	Gy	*010102*			981	8.8	Mc	971	8.2	Wd
957	8.6	Md	969	8.5	Jo	979	10.8	Gy	956	11.8	L	988	8.3	Pt	972	7.8	Mc
957	8.4	Ch	970	8.4	Me	984	10.8	Br	960	12.5	El	RU AND			973	8.0	Mc
957	8.0	Jo	971	8.4	Ko	X SCL			978	14.0	El	013238			974	8.4	We
961	8.6	El	971	8.2	Jo	*004435*			980	13.2	Pt	956	13.9	L	976	8.0	Jo
968	8.0	Jo	976	8.5	Jo	947[	13.6	Bl	984	13.1	Me	958	13.6	FO	978	8.0	Mc
969	9.1	Wd	979	8.6	Jo	RR AND			988	13.2	Pt	959	13.7	Ma	979	8.1	Jo
971	8.5	Jo	979	8.7	Ko	004533			U SCL			971	12.0	Jo	980	8.4	Pt
973	8.9	El	979	8.7	Sf	957	10.8	Jo	*010630*			976	11.7	Jo	981	8.2	Mc
974	9.2	Gy	980	8.8	Pt	960	10.7	El	947[	13.2	Bl	977	12.4	Br	988	8.0	Pt
974	8.9	Md	984	9.1	Sf	969	9.9	Me	U AND			980	11.9	Pt	S ARI		
976	9.2	Gy	988	8.9	Pt	973	9.8	Br	010940			988	11.0	Pt	015912		
976	8.4	Jo	T SCL			973	10.1	El	973	13.7	Br	Y AND			958	15.0	FO
979	9.0	Jo	*002438a*			975	9.7	Jo	984	13.3	Br	013338			983[	14.3	Br
979	9.2	Wd	949	12.7	En	976	9.8	Jo	986	13.3	El	949	8.7	Jo	R ARI		
979	9.3	Th	T PHE			979	9.4	Jo	UZ AND			953	9.0	Jo	021024		
980	9.2	Pt	*002546*			986	9.5	El	011041			956	8.8	L	949	8.8	Jo
985	9.5	Wd	941	12.6	Ht	RV CAS			956	9.9	L	958	8.9	FO	953	9.4	Jo
985	9.6	Hf	946	12.1	Ht	004746a			959	9.9	Ma	959	8.9	Ma	954	9.3	Ah
986	9.6	El	947	12.0	Bl	973	14.5	Br	973	10.2	Br	969	9.0	Jo	956	9.0	We
988	9.5	Pt	948	11.2	En	980	13.6	Pt	973	10.5	Bw	974	8.9	Gy	956	9.7	Ch
T CAS			W SCL			984	13.5	Me	S PSC			976	8.8	Gy	957	9.7	Ah
001755			*002833*			984	14.0	Br	011208			977	8.8	Br	957	9.5	L
940	11.4	Ch	951[	12.2	En	988	13.4	Pt	957	10.0	Jo	979	9.3	Sf	957	9.8	Jo
949	11.5	Jo	Y CEP			— CAS			961	10.0	El	980	9.4	Pt	958	9.7	FO
953	12.0	Jo	003179			004746b			974	10.0	El	988	9.5	Pt	959	10.1	Ma
954	11.1	Mn	973[	13.9	Br	980	10.8	Pt	977	10.0	Br	X CAS			961	9.9	Jo
956	11.8	L	977[	14.4	Br	984	10.6	Me	S CAS			014958			971	11.3	Jo
957	11.7	Jo	U CAS			988	10.8	Pt	011272			946	12.1	Bn	974	11.0	We
968	12.2	Jo	004047a			W CAS			958	14.0	FO	949	11.7	Jo	976	11.2	Jo
970	11.9	Me	949	8.7	Jo	004958			973[	13.9	Br	951	11.4	Bn	977	11.5	Br
971	12.2	Jo	953	8.5	Jo	949	11.5	Bl	988[	13.2	Pt	953	11.5	Jo	979	11.5	Jo
976	12.2	Jo	956	8.7	L	953	11.5	Bl				957	11.9	Bn	980	11.4	Pt
979	12.5	Jo	957	8.7	Jo	956	11.4	Ah							984	12.2	Br

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
R ARI	o CET	R TRI	U ARI	R TAU	X CAM
021024	*021403*	023133	030514	042209	043274
986 11.9 Me	980 9.0 Wd	979 9.8 Gy	976 11.9 Gy	978 13.3 Pt	969 8.5 Me
988 12.2 Pt	980 8.8 Hf	980 10.0 Ah	977 12.1 Br	987 13.1 Pt	970 8.1 Jo
W AND	980 8.6 Pt	980 9.6 Pt	X CET	W TAU	976 8.0 Jo
021143a	988 9.0 Pt	984 9.5 Sf	*031401*	042215	977 8.3 Br
949 8.4 Jo	S PER	988 9.1 Pt	953 12.0 Jo	953 9.3 Jo	978 8.1 Pt
953 8.4 Jo	021558	T ARI	960 11.3 Jo	958 10.1 Cy	979 8.1 Jo
954 8.8 Ah	949 9.2 Jo	024217	961 11.3 El	960 9.5 Jo	982 8.2 Me
957 8.9 Ah	953 9.2 Jo	949 8.4 Jo	976 10.0 Jo	974 10.6 Cy	987 8.2 Pt
958 8.5 FO	956 9.7 Ah	953 8.4 Jo	976 10.4 Gy	975 10.7 Jo	R DOR
960 8.6 Jo	958 9.8 FO	954 8.9 Ah	978 10.2 Pt	978 10.5 Pt	*043562*
961 8.0 Ko	960 10.1 El	957 9.0 Ah	978 10.2 El	979 10.6 Jo	937 5.5 Bl
969 8.9 Jo	971 9.4 Jo	957 10.2 Ko	979 10.4 Jo	979 10.8 We	943 6.0 Ht
971 8.5 Ko	976 9.3 Jo	960 8.5 Jo	982 9.7 El	987 10.4 Pt	947 5.5 Bl
973 9.5 Bw	978 9.7 El	971 9.2 Jo	987 10.0 Pt	S TAU	R PIC
974 9.5 Gy	979 9.3 Sz	975 9.7 Ko	Y PER	042309	*044349*
976 8.9 Jo	980 9.4 Pt	977 9.4 Me	032043	953 9.3 Jo	947 7.3 Bl
977 9.2 Br	980 9.4 Ah	979 9.2 Jo	953 10.0 Jo	960 9.8 Jo	V TAU
979 9.4 Gy	980 10.3 We	983 9.7 Me	954 10.6 Ah	976 10.0 Gy	044617
979 9.4 Jo	988 10.0 El	W PER	957 10.7 Ah	978 9.5 Pt	949 8.5 Jo
980 9.6 Pt	988 9.5 Pt	024356	960 10.0 Jo	979 12.5 Jo	953 8.6 Jo
980 9.4 Ko	993 9.4 Wd	949 8.7 Jo	960 10.7 Ko	979 10.6 We	976 9.3 Gy
988 9.7 Pt	993 9.5 Hf	953 8.7 Jo	960 10.5 El	987 10.2 Pt	977 9.1 Br
T PER	997 9.4 My	955 9.3 Cy	969 10.4 Jo	T CAM	978 9.1 Pt
021258	RR PER	955 9.3 Hl	972 10.1 Mc	043065	979 9.0 Jo
949 8.6 Jo	022150	956 9.2 Ah	973 10.1 Mc	953 8.5 Jo	987 9.2 Pt
953 8.5 Jo	957 11.4 L	960 9.1 Ko	975 10.2 Ko	954 8.6 Ko	R ORI
956 8.9 Ah	977 10.3 Br	960 8.8 Jo	976 9.6 Jo	957 7.9 Jo	045307
960 8.5 Jo	980 10.4 Pt	968 8.8 Jo	978 10.3 Pt	960 8.4 L	987 11.0 Me
971 8.6 Jo	988 9.7 Pt	968 9.4 Cy	978 9.8 Mc	963 8.3 Ko	R LEP
976 8.5 Jo	992 9.2 Bw	970 8.9 Ko	978 9.9 El	970 8.0 Jo	*045514*
979 8.7 Jo	R FOR	971 8.8 Jo	979 9.1 Jo	975 8.3 Ko	957 7.8 Ko
980 8.8 Pt	*022426*	972 9.9 Mc	981 9.6 Mc	976 7.8 Jo	957 8.1 L
980 9.2 We	947 10.0 Bl	973 9.7 Mc	982 9.7 Me	977 8.5 Br	960 8.2 Jo
980 8.7 Ah	U CET	975 9.3 Cy	987 10.5 Pt	978 8.4 Pt	967 7.9 Ko
988 8.9 Pt	*022813*	976 9.3 We	R PER	979 8.0 Jo	976 9.3 Gy
Z CEP	976 10.1 Gy	976 8.9 Jo	032335	980 8.5 We	978 8.0 Pt
021281	980 10.0 Pt	978 9.2 Hl	959 12.4 Ma	985 8.1 Wd	979 8.1 Ko
977[14.4 Br	988 10.8 Pt	978 8.9 Pt	977 12.9 Br	985 8.0 Hf	987 7.8 Pt
988[12.5 Pt	RR CEP	978 9.6 Mc	978 12.6 Pt	987 8.2 Pt	V ORI
o CET	022980	979 8.8 Jo	978 12.6 El	990 8.2 Hf	050003
021403	958 14.5 FO	979 9.0 Ko	987 12.3 Pt	990 8.2 Wd	958[13.3 L
952 8.4 We	977[13.5 Br	981 9.7 Mc	NOV PER	RX TAU	978[12.8 Pt
953 7.8 Jo	988[12.9 Pt	987 9.2 Me	032443	043208	987 12.5 Pt
954 8.2 Ah	R TRI	987 9.0 Pt	978 13.0 Pt	960 11.9 L	T LEP
955 8.1 Cy	023133	996 9.0 My	987 13.8 Pt	961 11.5 El	*050022*
957 8.5 Ah	949 11.8 Jo	R HOR	T FOR	978 12.8 Pt	957 11.6 Ko
957 8.0 L	953 11.5 Jo	*025050*	*032528*	982 11.9 L	960 12.5 Jo
959 8.2 Cy	954 11.7 Ah	937 7.5 Bl	957 9.0 L	987 12.9 Pt	978 11.5 Pt
959 8.2 Ma	957 11.3 Ah	941 7.8 Sl	X PER	R RET	979 11.5 Ko
960 7.9 Jo	959 11.4 Ma	943 7.8 Ht	034930	*043263*	987 11.8 Pt
974 8.6 Gy	960 10.3 Wd	947 7.8 Bl	972 6.4 Mc	937 7.6 Bl	AE AUR
974 8.8 Cy	960 10.6 Jo	949 8.1 Ht	973 6.3 Mc	943 8.5 Ht	050934
975 8.8 Si	970 10.4 Hf	T HOR	978 6.5 Mc	947 8.5 Bl	978 5.8 Mc
976 8.7 Gy	974 10.3 Gy	*025751*	981 6.0 Mc	X CAM	981 5.9 Mc
976 8.4 Jo	975 10.4 Sf	937 9.5 Bl	T TAU	043274	R AUR
979 8.6 Jo	976 9.7 Jo	941 9.4 Sl	041619	953 8.5 Jo	050953
979 8.8 Cy	979 9.6 Jo	943 9.3 Ht	930 10.2 Hr	957 8.0 Jo	974 12.1 Gy
980 9.2 Ah	979 9.8 Sf	947 9.3 Bl		960 8.2 L	978 12.0 Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.
R AUR			**T ORI**			**U AUR**			**Z AUR**			**Y MON**			**S VOL**		
050953			*053005a*			053531			055353			065111			*073173*		
979	12.0	Gy	967	10.0	Me	987	12.5	Pt	977	10.5	Me	978	12.2	Pt	936	9.1	Bl
980	11.0	Hf	967	10.0	Ko	**SU TAU**			978	10.6	Mc	988	11.7	Pt	946	9.3	Bl
980	10.8	Wd	968	10.5	Pt	054319			978	10.4	Pt	**R LYN**			**U CMI**		
981	11.5	Br	975	10.4	Pt	956	9.0	Cy	979	10.5	Pt	065355			073508		
987	12.0	Pt	977	9.9	Me	957	9.5	Ko	979	9.8	Jo	954	9.8	Ah	960	10.4	L
S AUR			978	10.3	Pt	957	9.5	L	981	10.7	Mc	957	9.5	Ah	978	9.7	Pt
052034			979	10.2	Ko	958	9.4	Cy	981	10.2	Pt	978	8.6	Pt	**S GEM**		
930	8.5	Pr	981	10.6	Pt	959	9.5	Ko	982	10.8	Me	980	8.8	Ah	073723		
953	8.8	Jo	982	10.0	Me	960	9.7	L	983	10.4	Pt	988	8.3	Pt	987	13.2	Pt
954	9.3	Ah	983	10.6	Pt	961	9.4	Cy	984	10.4	Pt	**RS GEM**			**T GEM**		
957	8.7	Ko	984	9.7	Pt	961	9.5	El	986	10.4	Pt	065530			074323		
960	8.7	Jo	987	10.2	Pt	963	9.5	L	988	10.2	Pt	982	12.2	Me	978	11.2	Pt
967	8.7	Ko	987	10.0	Me	965	9.5	Pt	989	10.2	Pt	988	11.8	Pt	982	11.4	El
976	9.7	Gy	988	10.2	Pt	967	9.6	Me	**R OCT**			**V CMI**			988	11.5	Pt
976	8.6	Jo	989	10.0	Pt	968	9.4	Pt	*055686*			070109			**R CNC**		
977	10.0	We	**AN ORI**			974	9.2	Cy	921	10.9	Ht	958	9.5	L	081112		
978	9.7	Mc	*053005f*			975	9.7	Pt	927	10.9	Ht	978	9.0	Pt	978	9.3	Pt
978	8.6	Pt	957	11.4	Ma	976	9.1	Gy	936	11.0	Bl	988	8.6	Pt	988	9.4	Pt
979	8.7	Jo	982	11.6	Me	976	9.2	Cy	939	10.5	Ht	**R GEM**			**V CNC**		
979	8.8	Ko	**S CAM**			977	9.7	Me	943	10.7	Ht	070122a			081617		
981	9.5	Mc	053068			978	9.7	Pt	946	10.5	Bl	978	12.7	Pt	960	9.6	L
982	9.3	Me	953	8.4	Jo	979	9.2	Cy	949	10.4	Ht	982	12.4	Me	978	10.3	Pt
987	8.5	Pt	957	8.3	Jo	981	9.5	Pt	**X AUR**			988	12.3	Pt	988	11.0	Pt
W AUR			970	8.4	Jo	982	9.5	El	060450			**Z GEM**			**RT HYA**		
052036			976	8.4	Jo	982	9.6	Me	960	12.9	L	070122b			*082405*		
953	9.5	Jo	978	8.5	Pt	983	9.6	Pt	978	12.8	Pt	978	12.5	Pt	967	8.1	Ko
958	9.4	L	979	8.3	Jo	984	9.6	Pt	982	12.6	Me	988	12.5	Pt	979	7.4	Ko
960	9.2	Jo	987	8.5	Pt	986	9.6	Me	983	12.7	Br	**TW GEM**			984	7.3	Pt
976	9.2	Jo	**RR TAU**			987	9.7	Me	987	12.5	Pt	070122c			988	7.3	Pt
978	9.2	Pt	053326			987	9.6	Pt	**V AUR**			978	8.0	Pt	**R CHA**		
979	8.8	Jo	957	12.2	Ko	988	9.6	Pt	061647			988	8.2	Pt	*082476*		
979	10.0	We	957	12.3	L	989	9.6	Pt	976	11.0	Gy	**R CMI**			925	11.5	En
982	9.2	Me	960	12.1	L	**U ORI**			**V MON**			070310			936	10.7	Bl
983	9.3	Br	963	12.2	L	054920a			*061702*			960	9.5	L	939	10.6	En
987	9.3	Pt	968	12.3	Pt	960	10.5	Jo	957	9.4	Ko	978	10.1	Pt	946	9.5	Bl
993	9.5	Wd	975	11.9	Pt	976	11.0	Gy	967	10.0	Ko	988	10.0	Pt	949	9.4	Ht
993	9.6	Hf	976	12.1	Gy	978	11.6	Pt	978	10.4	Pt	**RR MON**			**U CNC**		
S ORI			977	12.3	Me	980	11.5	Hf	979	10.3	Ko	071201			083019		
052404			978	12.1	Pt	980	11.4	Wd	987	10.9	Pt	960	12.3	L	963	11.9	L
961	8.2	El	979	12.2	Ko	982	11.2	Me	**AG AUR**			**V GEM**			982	13.3	El
976	8.7	Gy	981	12.0	Pt	987	11.7	Pt	062047			071713			**X UMA**		
978	8.7	Pt	982	11.3	Me	**V CAM**			960	9.2	L	960	9.4	L	083350		
982	8.5	Me	983	11.9	Pt	054974			**UU AUR**			961	9.6	El	984	10.5	Pt
982	8.5	El	984	11.6	Pt	980	14.4	L	062938			978	8.8	Pt	988	10.2	Pt
987	8.6	Pt	986	11.5	Me	981	14.2	Br	978	5.7	Mc	982	8.6	El	**S HYA**		
T ORI			987	11.2	Me	987	12.6	Pt	981	5.7	Mc	987	8.7	Me	084803		
053005a			987	11.9	Pt	**Z AUR**			**R MON**			988	8.6	Pt	984	11.1	Pt
930	10.9	Hr	988	11.8	Pt	055353			063308			**S CMI**			988	10.9	Pt
932	10.7	Hr	989	11.6	Pt	953	10.5	Jo	979	11.3	Ko	072708			**T HYA**		
933	10.6	Hr	**RU AUR**			954	9.9	Ah	**S LYN**			957	8.3	Ko	*085008*		
953	10.5	Jo	053337			957	10.5	Ah	063558			976	8.5	Ko	984	7.9	Pt
956	10.2	L	983	13.4	Br	957	10.1	Jo	958	13.5	L	978	9.0	Pt	988	8.5	Pt
957	9.8	Ma	987	12.4	Pt	965	10.3	Pt	978	13.2	Pt	979	9.0	Ko	**T CNC**		
957	10.0	Ko	**U AUR**			968	10.2	Pt	**X GEM**			987	9.3	Me	085120		
958	10.3	L	053531			973	10.7	Mc	064030			988	9.3	Pt	984	8.2	Pt
960	10.1	L	954	11.5	Ah	974	10.2	Pt	954	12.0	Bn	**T CMI**			988	8.2	Pt
960	10.5	Jo	963	12.8	L	975	10.4	Pt	982	12.8	Me	072811					
963	9.9	L	978	12.6	Pt	976	10.1	Jo				987	13.2	Me			

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
V UMA	S CAR	V HYA	U CEN	S UMA	R HYA
090151	*100661*	*104620*	*122854*	123961	*132422*
963 10.3 L	921 8.1 Ht	936 8.7 Bl	927 8.9 Ht	970 8.4 Mn	946 9.3 En
978 10.5 Mc	922 8.0 En	946 8.7 Bl	936 8.5 Bl	970 8.2 Ah	946 9.2 Bl
981 10.4 Mc	925 7.8 En	RS HYA	938 8.4 En	970 8.1 Mc	949 9.5 Ht
987 10.7 Mc	927 8.2 Ht	*104628*	939 8.5 Ht	972 8.2 Mc	S VIR
W CNC	936 8.8 Bl	920[13.7 Bl	943 8.5 Ht	972 7.9 El	*132706*
090425	939 9.0 Ht	RY CAR	945 8.1 En	973 8.0 Mc	912 7.2 Ch
960 8.8 L	939 9.1 En	*111561*	946 8.2 Bl	974 8.5 Gy	922 7.3 En
984 9.7 Pt	939 8.3 Sl	922[13.1 En	949 8.2 Ht	974 8.2 Pt	923 7.0 Ht
RW CAR	943 9.3 Ht	927[12.7 Ht	951 7.9 En	976 8.6 Gy	928 6.9 Ht
091868	945 8.3 Sl	937[13.1 En	T UMA	976 8.0 Jo	937 7.4 En
921[12.2 Ht	946 8.6 Bl	946[13.1 Bl	123160	976 8.1 Mn	939 6.9 Sl
936[12.2 Bl	949 8.7 Ht	RS CEN	939 9.6 Wr	977 7.8 Wd	939 7.2 Ht
Y VEL	U UMA	*111661*	940 10.0 Ch	978 7.8 Mc	945 7.3 Ht
092551	100860	939 13.3 Ht	949 9.5 Jo	979 8.3 Hf	946 7.4 En
920 12.9 Bl	953 6.5 Mn	943 13.3 Ht	953 9.9 Jo	979 8.0 Sz	949 7.5 Ht
946 12.4 Bl	958 6.5 Mn	946 13.1 Bl	953 10.4 Mn	979 7.8 Jo	RV CEN
R CAR	965 6.6 Mn	949 12.5 Ht	954 10.0 Ah	979 8.4 Wd	*133155*
092962	970 6.5 Mn	X CEN	955 10.0 Th	980 8.1 Ah	921 10.2 Ht
921 5.8 Ht	976 6.4 Mn	*114441*	957 10.0 Th	981 8.0 Mc	922 10.0 En
925 5.4 En	Z CAR	922 9.1 En	957 10.5 Ah	981 8.2 Th	927 10.5 Ht
936 6.3 Bl	*101058a*	923 9.7 Ht	957 10.6 Jo	981 8.0 Pt	936 10.0 Bl
937 6.2 En	920[12.6 Bl	928 9.9 Ht	958 10.4 Mn	995 7.7 Wr	938 10.0 En
939 6.3 Sl	W VEL	936 9.6 Bl	965 10.6 Mn	U OCT	939 10.3 Ht
946 6.3 Bl	*101153*	938 9.9 En	968 10.8 Jo	*131283*	943 10.3 Ht
Y DRA	921 9.5 Ht	939 10.2 Ht	970 11.4 Me	921 12.9 Ht	946 10.2 En
093178	936 9.8 Bl	943 10.5 Ht	971 11.2 Jo	922 12.4 En	946 10.3 Bl
956 10.2 Cy	946 9.9 Bl	946 10.5 Bl	974 11.2 Gy	927 12.4 Ht	949 10.7 Ht
963 10.9 L	RZ CAR	949 10.8 Ht	974 11.1 Pt	936 11.7 Bl	951 10.2 En
967 11.4 Cy	*103270*	AD CEN	976 11.3 Gy	938 11.2 En	T UMI
974 11.0 Cy	921[13.1 Ht	*114858*	976 10.9 Jo	939 11.9 Ht	133273
R LMI	939[12.7 En	921 9.4 Ht	979 11.4 Jo	943 11.4 Ht	954[14.2 L
093934	R UMA	927 9.1 Ht	981 11.6 Pt	946 10.8 Bl	T CEN
984 9.7 Pt	103769	939 9.4 Ht	RS UMA	946 10.8 En	*133633*
988 10.0 Pt	940 10.7 Ch	943 9.5 Ht	123459	949 11.2 Ht	922 8.0 En
R LEO	943 9.5 Hi	949 9.3 Ht	899 11.3 Ch	951 10.7 En	923 7.5 Ht
094211	949 9.9 Jo	W CEN	950[13.2 Bn	V CVN	928 7.2 Ht
984 9.0 Pt	953 10.2 Jo	*115058*	974 14.0 Pt	131546	936 6.5 Bl
987 9.3 Mc	953 10.5 Mn	921 11.6 Ht	977[13.2 Bn	952 8.7 Th	937 6.8 En
988 8.7 Pt	955 10.8 We	922 11.7 En	S UMA	955 8.4 Th	939 6.3 Sl
L CAR	956 10.7 Ah	925 12.0 En	123961	956 8.3 Th	940 6.7 Ht
094262	957 10.4 Jo	927 11.9 Ht	939 9.6 Wr	959 8.1 Th	945 6.6 Ht
939 3.8 Sl	958 11.0 Mn	936 12.4 Bl	940 9.8 Ch	966 7.6 GD	946 6.2 Bl
Z VEL	958 10.6 Cy	938 12.2 En	949 9.0 Jo	967 7.9 Th	946 6.5 En
094953	961 10.7 El	939 12.4 Ht	953 8.6 Jo	979 8.1 Th	RT CEN
921[12.1 Ht	965 10.9 Mn	943 12.5 Ht	953 9.7 Mn	981 8.1 Th	*134236*
946[12.8 Bl	968 10.7 Cy	946 12.8 Bl	954 8.6 Ah	981 8.0 GD	922 11.1 En
V LEO	974 11.1 El	949 12.6 Ht	955 8.8 We	987 8.2 GD	923 11.4 Ht
095421	974 11.5 Gy	R CRV	955 8.5 Th	R HYA	928 10.9 Ht
984 13.5 Pt	974 11.3 We	*121418*	957 8.8 Th	*132422*	936 10.1 Bl
RR CAR	975 11.5 Cy	939 8.3 Sl	957 8.5 Ah	912 8.2 Ch	938 10.4 En
095458	976 11.5 Jo	T CVN	957 8.3 Jo	922 8.7 En	940 10.4 Ht
921 7.9 Ht	979 11.6 Jo	122532	958 8.8 Mn	923 8.8 Ht	945 10.1 Ht
927 7.9 Ht	979 11.3 Sz	943 10.8 Hi	964 8.5 Hf	928 8.8 Ht	945 10.0 En
RV CAR	979 11.6 Wd	U CEN	965 8.6 Mn	936 8.8 Bl	946 9.9 Bl
095563	979 11.5 Gy	*122854*	967 8.3 Ah	937 9.0 En	951 9.4 En
921[12.5 Ht	982 11.4 El	921 9.2 Ht	968 8.3 Ah	939 8.8 Sl	R CVN
946[13.1 Bl	984 11.9 Pt	922 8.7 En	968 8.2 Jo	939 9.3 Ht	134440
		925 8.7 En	969 8.5 Hf	943 9.3 Ht	912 11.7 Ch

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.
R CVn		R Cen		V Boo		Y Lib		RS Lib		U Lib	
134440		*140959*		142539a		*150605*		*151822*		*153620a*	
949	11.8 Jo	951	6.9 En	981	8.5 Pt	928	8.9 Cy	922	8.3 En	946	12.8 Bl
953	11.5 Jo	U UMi		984	8.6 Sf	942	8.8 Cy	923	8.1 Ht	T Nor	
968	10.7 Jo	141567		R Cam		954	9.7 L	928	8.2 Ht	*153654*	
971	10.5 Jo	943	11.1 Hi	142584		S Lib		936	8.7 Bl	922	8.9 En
974	11.0 Pt	953	11.0 Jo	943	10.6 Hi	*151520*		938	9.4 En	923	9.3 Ht
976	10.4 Gy	954	11.3 Ah	956	9.8 Ch	942	10.2 Ch	941	9.3 Ht	928	9.4 Ht
979	10.3 Sz	959	11.7 Cy	956	8.7 We	S Ser		946	9.8 Ht	937	10.1 En
981	10.2 Pt	960	10.8 Jo	957	9.3 Jo	151714		946	9.9 En	939	10.1 Ht
RX Cen		968	11.7 Cy	961	9.0 Jo	928	9.6 Cy	946	9.6 Bl	943	10.4 Ht
134536		970	11.5 Jo	970	9.5 Jo	942	9.5 Cy	RU Lib		946	10.2 En
936	12.8 Bl	974	11.6 Cy	976	9.2 Jo	942	10.8 Ch	*152714*		949	10.5 Ht
938	12.6 En	974	11.8 Pt	979	9.4 Jo	951	9.9 Cy	942	10.0 Ch	Z Lib	
940	12.9 Ht	975	11.5 Me	980	9.6 We	959	9.5 Cy	974	8.0 Pt	*154020*	
945	11.7 En	979	11.7 Jo	R Boo		968	8.7 Cy	R Nor		920[	12.7 Bl
945	11.6 Ht	979	10.9 Sz	143227		971	8.7 Bw	*152849*		R CrB	
946	11.2 Bl	981	11.6 Pt	917	9.7 Wr	972	8.3 Md	922	9.0 En	154428	
946	11.6 En	S Boo		939	11.3 Wr	974	8.4 Pt	923	9.4 Ht	873	5.9 Hr
947	11.4 En	141954		949	11.5 Jo	979	8.1 Md	928	9.6 Ht	899	6.0 Ch
951	11.2 En	958	13.2 Ch	951	11.3 Ch	981	8.0 L	936	9.5 Bl	904	6.1 Hr
T Aps		974	13.1 Pt	953	11.6 Jo	981	7.6 Pt	937	9.7 En	907	6.0 Mg
134677		981	13.0 Pt	954	12.0 Ah	S CrB		939	9.7 Ht	911	5.9 Hr
920	13.6 Bl	981	13.0 L	955	11.5 Bc	151731		943	10.1 Ht	912	5.9 Hr
936	12.8 Bl	RS Vir		957	11.7 Jo	939	12.0 Wr	946	9.9 En	914	5.9 Hr
939	13.1 Ht	142205		961	12.0 Jo	949	10.2 Jo	946	9.7 Bl	920	6.2 Hr
943	12.5 Ht	954	9.5 L	974	12.3 Pt	951	10.2 Ch	949	10.3 Ht	940	5.7 Ch
946	12.0 En	957	8.9 Ko	981	12.6 Pt	953	9.8 Jo	X Lib		941	6.0 Oy
946	11.5 Bl	967	8.5 Ko	S Lup		953	10.1 Mn	*153020*		949	6.0 Ad
949	12.0 Ht	975	8.1 Ko	*144646a*		954	9.7 Bc	946	10.8 Bl	949	5.8 Jo
Z Boo		V Boo		922[	12.1 En	954	9.8 Bf	W Lib		950	6.0 Ch
140113		142539a		939[	12.1 En	954	10.0 Ko	*153215*		953	6.0 Cy
951[	13.4 Ch	949	9.1 Jo	U Boo		955	9.8 Bf	936	11.4 Bl	953	5.9 Mn
954[	13.4 L	951	9.2 Ch	144918		955	10.0 Bc	942	12.0 Ch	953	6.2 Gt
RU Hya		952	9.3 Vh	950	10.7 Cy	956	9.6 We	946	11.5 Bl	953	6.0 Be
140528		953	9.4 Mn	951	10.7 Ch	956	9.8 Ah	S UMi		954	6.0 Bf
922	8.7 En	953	8.7 Jo	959	10.6 Cy	957	9.5 Ah	153378		954	6.0 Be
923	8.2 Ht	954	9.1 Ah	968	11.2 Cy	958	9.6 Mn	940	10.2 Ch	954	6.0 Bc
928	8.5 Ht	957	9.0 Ah	973	11.1 Bw	960	8.8 Jo	952	9.8 Vh	954	5.8 Ko
936	9.1 Bl	957	9.2 Cy	Y Lup		964	8.6 Ko	954	10.0 Ah	954	6.1 Ah
937	9.6 En	957	8.8 Jo	*145254*		965	8.8 Mn	955	10.8 We	954	6.0 L
940	9.3 Ht	958	9.3 Mn	920[	13.7 Bl	967	8.7 Ah	957	10.4 Ko	955	6.0 Bf
945	9.5 Ht	965	9.1 Mn	937[	13.7 En	968	8.6 Jo	960	9.1 Jo	955	6.0 We
945	9.7 En	967	8.9 Cy	S Aps		969	9.3 Si	967	10.7 Ko	955	6.0 Bc
946	9.7 Bl	967	8.9 Ah	*145971*		969	8.8 Sf	967	10.2 Me	955	6.1 Ch
951	9.7 En	968	8.6 Jo	920	13.0 Bl	970	8.6 Mn	970	11.0 Sf	955	6.0 Cy
R Cen		969	9.0 Sf	936	12.5 Bl	970	8.3 Me	970	10.2 Jo	956	6.1 An
140959		970	8.9 Mn	939	13.0 En	973	8.3 El	974	10.9 Pt	956	6.2 Gt
921	7.6 Ht	972	9.5 Mc	940	13.0 En	974	8.4 Pt	974	11.0 We	956	6.1 Ah
922	7.6 En	972	9.0 GD	942	12.9 En	975	8.5 Sf	974	10.8 Gy	957	6.1 Ah
925	7.6 En	973	9.4 Mc	943	13.0 Ht	975	8.3 Ko	975	11.2 Sf	957	6.1 An
927	7.2 Ht	974	8.8 Pt	945	12.8 Ht	976	8.1 Mn	976	11.2 Gy	957	6.0 Ko
936	7.0 Bl	975	8.8 Sf	945	12.9 En	976	8.3 Jo	976	11.0 Ko	957	6.0 Cy
937	7.5 En	975	8.9 Cy	946	12.5 Bl	979	8.0 Jo	979	10.0 Jo	958	6.0 Cy
939	7.1 Ht	976	8.6 Jo	949	12.7 Ht	979	8.6 Sz	981	11.4 Pt	958	5.9 Mn
943	7.0 Ht	976	8.9 Mn	951	12.8 En	980	8.5 Wr	982	11.6 Me	959	5.9 Ad
945	6.7 Sl	978	9.0 Mc	T Lib		981	8.2 Pt	984	11.6 Sf	959	6.0 Bc
946	6.9 Bl	979	8.7 Jo	*150519*		983	8.5 Sf	U Lib		959	5.9 Ko
946	7.0 En	980	8.9 Me	942[	13.2 Ch	995	8.0 Wr	*153620a*		959	6.0 Cy
949	6.8 Ht	981	9.1 Mc					936	11.8 Bl	960	6.0 Bc

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J.D.Est.Obs.		J.D.Est.Obs.		J.D.Est.Obs.		J.D.Est.Obs.		J.D.Est.Obs.		J.D.Est.Obs.	
R CrB		R CrB		V CrB		Z Sco		SX Her		S Sco	
154428		154428		154639		*160021*		160325		*161122b*	
960	6.0 Cy	977	5.9 Mg	956	8.2 Th	923	9.5 Ht	971	8.2 An	923[12.6 Ht	
960	6.0 L	978	6.0 Mc	957	7.9 Th	924	9.8 En	972	8.6 Me	947[13.4 Bl	
960	6.0 Jo	978	6.0 Me	957	7.5 Ah	928	9.4 Ht	973	8.7 Ko	974 13.5 Pt	
961	6.0 Cy	979	6.0 GD	959	7.8 Cy	936	9.1 Bl	974	8.4 Me	W CrB	
961	5.9 Ko	979	6.0 Hf	959	8.1 Th	938	9.5 En	974	8.4 Pt	161138	
963	5.9 Ko	979	6.1 Sz	960	7.4 Jo	941	9.6 Ht	975	8.2 Pt	969 11.4 Wa	
963	6.0 Cy	979	6.0 Sh	963	7.9 Th	946	9.5 Ht	975	9.0 Me	969 11.4 Bw	
964	5.9 Hf	979	6.0 Gy	967	7.8 Th	946	9.3 En	976	8.5 Jo	972 11.3 Md	
964	6.0 Be	979	5.9 Ko	967	7.3 Ah	947	9.6 Bl	976	8.4 Ko	974 11.0 Pt	
965	5.8 Mn	979	6.0 Jo	968	7.9 Cy	957	9.7 An	978	8.6 Me	979 10.9 Sz	
965	6.0 Me	979	5.9 Pt	968	7.4 Jo	R Her		979	8.6 Jo	984 10.5 Pt	
966	5.9 Me	980	5.7 Pt	972	7.6 Md	160118		979	8.4 Pt	W Oph	
966	6.0 GD	980	6.1 Me	972	7.9 Mc	949	12.3 Jo	979	8.3 Ko	*161607*	
967	5.8 Bg	981	5.7 Bg	974	7.1 Pt	953	11.7 Jo	980	8.3 Pt	954[13.7 L	
967	6.0 Mg	981	6.0 GD	975	8.1 Cy	957	11.4 Jo	980	8.7 Me	974[12.5 Pt	
967	6.0 Be	981	6.1 We	976	7.3 Jo	957	11.2 Ko	981	8.7 L	V Oph	
967	6.0 Ko	981	6.0 Be	976	8.3 Th	959	11.1 Cy	981	8.3 Pt	*162112*	
967	6.0 Cy	981	6.0 Mc	977	7.6 Hi	961	10.7 Jo	984	8.4 Pt	949 7.7 Jo	
967	5.8 Pt	981	5.9 Ko	977	7.4 Mg	967	10.0 Ko	984	8.6 Me	950 8.4 Ch	
967	5.9 Me	981	5.7 Pt	978	7.8 Mc	969	10.4 Bw	985	9.0 Me	953 7.6 Jo	
968	6.0 Me	981	6.0 L	979	7.8 Th	969	9.7 Jo	986	8.6 Pt	957 7.8 Jo	
968	6.0 Bg	983	6.1 Hf	979	7.4 Jo	971	9.7 Jo	987	8.6 Pt	969 7.8 Jo	
968	6.1 An	984	6.2 Me	981	7.0 Pt	974	10.0 Pt	988	8.7 Pt	974 8.2 Pt	
968	6.0 Cy	984	5.7 Pt	981	8.3 Th	975	9.6 Cy	W Sco		979 8.0 Jo	
968	6.0 L	985	6.1 Me	981	7.7 Mc	976	9.8 Ko	*160519*		981 8.6 L	
968	6.0 Jo	985	6.1 Wd	R Lib		976	9.6 Sf	920[14.0 Bl		U Her	
969	6.0 Si	986	5.9 Pt	*154715*		976	9.6 Jo	RU Her		162119	
969	6.1 Wd	987	5.8 Pt	942	12.3 Ch	976	9.7 Gy	160625		951 13.3 Ch	
969	6.0 Ko	988	5.9 Pt	R Lup		978	10.1 We	942	8.8 Pr	974 12.4 Pt	
969	6.0 Cy	991	5.9 Bg	*154736*		981	9.8 Pt	949	8.6 Jo	984 12.5 Pt	
969	6.0 L	992	5.9 Hu	922	10.0 En	984	9.6 Sf	950	9.0 Ch	SS Her	
969	6.0 Me	993	6.0 Hu	938	10.2 En	U Ser		954	9.3 Ah	162807	
970	5.9 Hf	X CrB		940	10.2 Sl	160210		956	8.2 Vh	951 9.2 Ch	
970	5.7 Mn	154536		946	10.0 En	943	12.0 Ie	956	8.6 We	952 9.7 Th	
970	6.0 Be	969	13.3 Bw	RR Lib		955[12.0 Bf		957	8.9 Ko	956 9.8 Th	
970	6.0 Cy	977	12.6 Mg	*155018*		957[12.0 An		957	9.3 Ah	960 10.1 Cy	
970	6.0 L	981	12.9 L	974[11.9 Pt		968[12.0 Wa		960	9.6 Cy	960 9.4 Jo	
970	6.1 Me	R Ser		Z CrB		981[12.3 Pt		967	9.2 Ko	961 9.6 Jo	
971	5.8 Bg	154615		155229		X Sco		967	9.8 Cy	969 10.4 Jo	
971	6.0 Ko	951	10.7 Ch	928	11.6 Cy	*160221a*		967	9.3 Ah	969 11.0 Sf	
972	6.0 Me	957	10.2 Cy	944	9.8 Cy	936	11.2 Bl	967	9.1 Me	970 9.8 We	
973	5.7 Bg	968	9.8 Cy	950	10.0 Ch	947	11.8 Bl	969	8.0 Jo	970 11.1 Me	
973	6.0 Mc	972	11.0 Md	951	9.5 Cy	974	9.4 Pt	971	9.1 Bw	971 11.3 An	
973	5.9 Ko	974	10.2 Pt	977	10.2 Md	981	9.8 Pt	971	9.5 An	974 11.3 Pt	
974	5.9 Bg	975	9.4 Cy	981	10.2 L	SX Her		974	9.6 Gy	975 11.7 Sf	
974	6.0 Gy	979	9.8 Sz	RZ Sco		160325		975	10.2 Cy	979 11.7 Jo	
974	6.0 Me	981	10.0 Pt	*155823*		949	8.3 Jo	976	9.8 Gy	981 11.8 L	
974	5.7 Pt	V CrB		922	9.7 En	956	7.7 Vh	976	9.3 Ko	984 12.1 Pt	
975	5.7 Pt	154639		923	10.0 Ht	957	7.9 Ko	976	9.0 Jo	T Oph	
975	6.0 Si	942	8.0 Hi	928	9.9 Ht	960	8.0 Ko	979	9.0 Jo	*162815*	
975	6.0 Be	949	7.3 Jo	938	10.0 En	964	8.0 Ko	981	9.4 L	942 13.3 Ch	
975	5.8 Ko	950	7.2 Ch	941	9.6 Ht	966	8.0 Me	984	10.2 Me	973[13.1 Bw	
975	6.0 Me	952	8.1 Th	946	10.0 Ht	967	8.2 Me	R Sco		S Oph	
976	6.2 Jo	953	7.4 Jo	946	10.0 En	967	8.1 Ko	*161122a*		*162816*	
976	5.6 Pt	954	7.4 Ah	974	11.5 Pt	967	8.2 Pt	946	12.8 Ht	942[13.1 Ch	
976	5.8 Mn	954	8.2 Th	Z Sco		968	8.1 Me	947	13.1 Bl	947[13.2 Bl	
976	6.2 Gy	954	7.8 Bc	*160021*		969	8.0 Jo	974	10.8 Pt		
977	5.7 Bg	955	8.2 Th	922	9.5 En	970	8.2 Me				

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J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs.

W HER
163137
928 10.7 Hl
943 11.4 Hl
951 11.6 Ch
969 12.3 Wa
971 12.5 An
971 12.7 Bw
972 12.8 El
974 12.6 Pt
980 12.9 Me
984 12.0 Pt

R UMI
163172
928 9.2 Pr
953 9.6 Jo
954 10.0 Bf
954 10.0 Bc
957 9.8 Jo
969 9.8 Jo
972 8.6 We
973 8.6 Mc
974 9.0 We
976 9.9 Jo
979 10.2 Jo
981 8.6 Mc
981 10.3 L

R DRA
163266
951 12.3 Ch
953 12.3 Jo
957 12.0 Jo
961 11.9 Ma
969 11.9 Jo
974 12.1 Pt
974 11.7 Gy
976 11.8 Gy
976 11.5 Jo
978 11.5 El
979 11.4 Jo
984 11.6 Pt

RR OPH
164319
924 12.5 En
939[12.0 En
974[12.0 Pt

S HER
164715
951 12.1 Ch
960 12.5 Jo
969 12.5 Jo
969 12.1 Wa
974 12.0 Pt
984 12.6 Pt

RS SCO
164841
945 11.9 Ht
946 12.0 En
947 11.9 Bl

RR SCO
165030a
920 10.0 Bl
923 10.2 Ht
924 9.6 En
928 9.9 Ht
936 9.0 Bl
938 9.5 En
940 8.7 Sl
941 8.8 Ht
946 8.1 Ht
946 8.7 En
947 8.9 Bl

SS OPH
165202
943[11.9 Hi
951[12.6 Ch
984 12.5 Pt

RV HER
165631
907 11.6 Mg
981 14.5 L

RT SCO
165636
920[14.0 Bl
939[12.1 En

R OPH
170215
949 10.2 Jo
953 9.8 Jo
957 9.6 Jo
968 9.6 Jo
971 9.0 Jo
974 8.6 Pt
979 8.4 Jo
984 7.4 Pt

RT HER
170627
928 11.0 Pr
940 11.7 Ch
949 11.6 Jo
953 11.8 Jo
960 12.2 Jo
971 13.1 Bw
974 12.6 Pt
984 13.3 Pt

RW SCO
170833
920[13.0 Bl
946[12.5 En

α HER
171114
972 3.4 Mc
981 3.4 Mc

Z OPH
171401
928 8.3 Cv
944 8.2 Cv
944 8.2 Hl
949 8.2 Jo
951 8.3 Cv
952 8.4 Th
954 8.3 Ah
956 8.5 Th
956 8.4 Hl
957 8.0 Jo
960 8.4 Cv
965 8.3 My
967 8.5 Cv
967 8.5 Ah
968 8.0 Jo
969 8.9 Wd
974 8.2 Pt
976 8.3 Cv
978 8.4 Hl
979 8.4 Jo
981 9.0 We
984 8.9 Pt

RS HER
171723
949 8.1 Jo
953 8.1 Jo
954 8.7 Ah
957 8.8 Ah
957 9.0 Md
960 8.4 Jo
967 9.1 Ah
969 8.6 Jo
970 9.4 Hi
972 9.3 Md
974 8.9 Pt
977 8.8 We
978 9.4 Hi
979 9.4 Jo
980 9.6 B
983 9.8 Wa
984 10.0 Pt

S OCT
172486
920 13.5 Bl
939 12.8 Ht
943 12.3 Ht
947 12.2 Bl
949 12.4 Ht

RU OPH
172809
951 10.0 Ch
957 12.0 Md
957 12.3 An
960 12.5 L
970 12.7 Me
974 13.0 Pt
984 13.4 Pt

RT SER
173411
954 12.9 L

RU SCO
173543
920 10.1 Bl
924 10.2 En
936 10.0 Bl
939 9.8 En
946 9.9 En
947 9.5 Bl

SV SCO
174135
920[13.0 Bl
946 12.6 En

W PAV
174162
920[13.0 Bl
941[13.0 Ht
946[13.0 En

RS OPH
174406
974 11.1 Pt
984 11.1 Pt

U ARA
174551
941 12.7 Ht
945 12.8 Ht
946 13.0 En

RT OPH
175111
951 12.0 Ch
980 12.4 B

T DRA
175458a
977 12.3 Mg

UY DRA
175458b
977 10.9 Mg

RY HER
175519
901 13.1 Mg
961 13.1 Ma
974 12.4 Pt
977 12.0 Md
979 12.0 Ie
981 11.8 L
984 11.8 Pt

V DRA
175654
951 11.8 Ch
971 13.1 Bw
974 12.7 Pt
975 13.1 Bw
981 13.4 L
983 13.5 Bw
984 13.1 Pt

R PAV
180363
923 11.9 Ht

R PAV
180363
946[11.9 En
946 11.9 En
950 11.1 Ch
953 10.4 Jo
954 10.4 Ah
955 9.8 Bc
955 9.8 Bf
957 9.6 Jo
966 9.4 Me
968 9.0 Bf
968 9.1 Bc
969 8.7 Jo
972 8.8 Bc
974 8.9 Gv
974 8.9 Pt
975 8.7 Bc
975 8.5 Bf
975 8.4 Mc
976 8.5 Jo
976 8.8 Gv
976 9.4 We
978 9.0 El
978 8.7 Bc
979 8.4 Bc
979 8.4 Bf
980 8.7 B
980 8.6 Ah
981 8.5 L
984 7.9 Pt
984 8.2 Wa
990 7.5 Ad

W DRA
180565
957 12.0 Md
974 12.6 Pt
984 13.5 Pt

X DRA
180666
974 12.5 Pt
984 12.8 Pt

TV HER
181031
954 9.7 L
981 10.5 L

RY OPH
181103
926 12.7 Cy
940 11.7 Sl
944 10.8 Cy
951 10.0 Cy
960 9.6 Cy
967 8.8 Cy
973 8.6 Bw
974 8.1 Pt
976 8.2 Cy
977 7.9 Md

RY OPH
181103
978 8.2 We
984 7.5 Pt

W LYR
181136
953 7.8 Jo
954 8.2 Ah
957 8.1 Ah
957 7.5 Jo
964 8.0 Hf
967 8.1 Ah
969 7.7 Jo
969 7.9 Wd
969 8.0 Hf
970 8.0 Hf
970 8.0 Sf
970 7.9 Wd
970 8.0 Ah
971 7.9 Md
971 7.7 We
971 7.9 An
974 7.7 Pt
975 8.3 Sf
976 7.9 Jo
978 8.1 Md
979 8.2 GD
979 8.2 Hf
979 8.2 Sh
979 8.3 Wd
979 7.8 Jo
980 8.1 B
980 8.4 Ah
981 8.1 L
983 8.5 Sf
984 8.4 Wd
984 8.3 Pt
985 8.4 Wd
985 8.4 Hf
993 8.7 Hf
993 8.8 Wd

RV SGR
182133
920[13.6 Bl
939[12.4 En

SV HER
182224
951 12.8 Ch
970 11.5 Be
970 11.1 L
972 11.2 El
974 11.2 Pt
975 11.4 Bw
984 10.5 Pt
988 9.7 El

T SER
182306
974[12.2 Pt
984[12.9 Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
SV DRA	R SCT	R SCT	R SCT	S CRA	R AQL	
183149	*184205*	*184205*	*184205*	*185437a*	190108	
961[13.6 Ma	939 5.1 Sl	969 5.5 Me	981 5.6 GD	947 12.0 Bl	957 6.1 Ko	
RZ HER	941 5.5 Oy	969 5.5 Jo	981 5.6 We	ST SGR	957 6.0 Ah	
183225	942 5.5 Ch	970 5.7 Hf	981 5.5 Mc	*185512a*	958 5.8 Mn	
980[13.4 Bw	949 5.6 Ad	970 5.8 We	981 5.3 Ko	945 12.0 Ch	959 5.9 Ad	
981[13.3 L	951 5.5 Ch	970 5.3 Be	981 5.5 L	960 11.8 L	965 6.1 Mn	
X OPH	952 5.7 Vh	970 5.7 Mn	982 5.3 Bg	966 10.9 Bk	967 6.4 Ko	
183308	952 5.7 Mn	970 5.2 L	982 5.3 Me	R CRA	967 6.2 Ah	
929 8.9 Cy	953 5.8 An	970 5.6 Me	983 5.3 Me	*185537a*	969 7.0 Jo	
940 8.5 Cy	953 5.1 Gt	971 5.4 Bg	983 5.3 Hf	920 12.5 Bl	969 6.9 Si	
951 8.4 Cy	953 5.5 Jo	971 5.6 Ko	984 5.5 Wa	923 12.2 Ht	970 6.4 Mn	
953 8.4 Jo	954 5.1 Bc	972 6.0 GD	984 5.3 Me	924 12.1 En	970 6.5 Ah	
953 8.4 Mn	954 5.1 Ko	972 5.4 Mc	984 5.4 Pt	940 13.3 Sl	974 6.4 Pt	
956 8.0 We	955 5.1 Bf	972 5.8 Bc	985 5.5 Mc	940 12.3 Ht	975 6.8 Si	
956 8.2 Ch	955 5.6 We	972 5.5 Me	985 5.3 Hf	945 12.5 Ht	976 6.4 Mn	
957 8.6 An	955 5.1 Bc	973 5.3 Bg	985 5.3 Wd	947 13.0 Bl	976 6.6 Ko	
957 8.5 Be	956 5.1 Bc	973 5.3 Mc	986 5.3 Me	T CRA	979 7.3 Jo	
957 8.6 Ko	956 5.4 Si	973 5.7 Bc	986 5.5 Pt	*185537b*	980 7.3 Ah	
957 8.9 Ah	956 5.9 An	973 5.4 Ko	987 5.4 Pt	920 13.0 Bl	980 6.5 Mn	
957 8.5 L	956 5.2 Gt	974 5.4 Bg	988 5.3 Pt	940 12.5 Ht	984 7.0 Pt	
958 8.5 Mn	957 5.8 An	974 5.5 Gy	988 5.2 Bg	940 13.3 Sl	990 7.0 Ad	
959 8.3 Cy	957 5.4 Be	974 5.8 Bc	990 5.2 Ad	945 12.5 Ht	V LYR	
960 8.5 Jo	957 5.2 Ko	974 5.4 Mc	991 5.4 Bg	947 13.0 Bl	190529a	
965 8.4 Mn	957 5.3 Cy	974 5.5 Pt	992 5.2 Bg	Z LYR	974 11.3 Pt	
967 8.6 Ko	957 5.2 Jo	975 5.4 Pt	992 5.4 Hu	185634	978 11.3 Me	
967 8.3 Cy	958 5.1 Bf	975 5.4 Mc	993 5.5 Hu	957[14.5 L	RX SGR	
967 9.0 Ah	958 5.7 Mn	975 6.1 Bf	993 5.4 Hf	974[12.3 Pt	*190818*	
969 8.5 Jo	958 5.1 Bc	975 5.4 Bg	993 5.6 Wd	980[13.8 Bw	923[12.7 Ht	
969 8.8 Si	959 5.1 Bc	975 5.5 Si	995 5.7 Hu	SU SGR	940[12.7 Ht	
970 8.6 Mn	959 5.3 Ko	975 6.0 Bc	Nov AQL	*185722*	949[13.1 Ch	
971 8.0 We	959 5.4 Ad	975 5.3 Ko	184300	923 8.6 Ht	969[13.1 Bw	
971 8.9 An	960 5.5 L	976 5.7 Mn	960 10.7 Jo	928 8.5 Ht	984[12.2 Pt	
974 8.6 Pt	961 5.9 Ma	976 5.6 Gy	961 10.5 Ma	940 8.5 Ht	RW SGR	
976 8.5 Mn	961 5.2 Ko	976 5.4 Jo	967 11.5 Pt	945 8.5 Ht	*190819a*	
976 8.7 Ko	961 5.3 Cy	976 5.4 Pt	970 10.8 Me	RT LYR	923 10.4 Ht	
976 8.7 Cy	963 5.4 Ko	977 5.4 Me	974 10.5 Gy	185737	924 10.3 En	
976 8.6 Jo	964 5.6 Hf	977 5.3 Bg	974 11.5 Pt	957 13.5 Bc	928 10.6 Ht	
978 8.7 Si	964 5.8 Bc	977 5.5 Mg	976 10.6 Jo	957 13.7 L	940 10.8 Ht	
979 8.5 Jo	965 5.7 Mn	978 5.0 Si	976 10.4 Gy	974 11.5 El	940 10.5 En	
980 8.4 Mn	965 5.3 Me	978 5.5 Mc	979 10.8 Jo	988 10.9 El	945 10.8 Ht	
984 8.6 Pt	965 5.5 Pt	978 5.7 Bc	984 11.5 Pt	V AQL	949 11.0 Ch	
RS DRA	966 5.3 Me	978 5.3 Me	RX LYR	*185905*	960 10.7 L	
184074	966 5.2 Bk	979 5.3 Jo	185032	954 7.7 Mn	969 10.3 Me	
956 10.9 Ch	966 5.3 Bg	979 5.6 Pt	957 13.0 Be	958 7.8 Mn	969 10.3 Bw	
RY LYR	966 5.5 Bc	979 5.5 Bf	957 13.0 L	967 7.8 Mn	974 9.8 Pt	
184134	967 5.7 Bf	979 5.2 GD	969 12.8 Me	970 7.8 Mn	984 9.3 Pt	
957 15.0 L	967 5.4 Bg	979 5.4 Hf	974 12.9 Pt	976 7.8 Mn	TY AQL	
984[12.5 Pt	967 5.7 Bc	979 5.1 Si	975 12.6 Me	980 7.8 Mn	*190907*	
R SCT	967 5.3 Ko	979 5.4 Sh	982 12.5 Me	R AQL	956 10.2 Vh	
184205	967 5.5 Me	979 5.3 Wd	984 12.8 Pt	190108	966 10.9 Wi	
873 5.9 Hr	967 5.3 Pt	979 5.5 Gy	S CRA	949 5.9 Ad	966 10.0 Me	
899 7.1 Ch	968 5.9 Bf	979 5.5 Bc	*185437a*	949 6.6 Jo	966 10.9 Bk	
904 6.5 Hr	968 5.5 Bg	979 5.2 Ko	920 12.3 Bl	953 6.0 Jo	967 10.2 Me	
907 7.4 Mg	968 5.8 Bc	980 5.3 Bf	923 11.5 Ht	954 6.1 Si	969 11.0 Bw	
911 7.4 Hr	968 5.7 Wd	980 5.7 Mn	924 11.5 En	954 5.7 Mn	969 10.6 Me	
912 7.4 Hr	969 5.5 Bg	980 5.3 Bc	939 12.0 En	954 6.0 Ah	970 10.2 Me	
913 7.3 Hr	969 5.8 Hf	980 5.3 Me	940 12.2 Sl	955 5.9 Ch	972 10.2 Me	
914 7.3 Hr	969 5.5 Si	980 5.5 Pt	940 12.1 Ht	956 6.4 Si	974 10.2 Me	
920 6.4 Hr	969 5.6 Ko	981 5.6 Pt	945 12.2 Ht	956 6.3 We	974 10.6 Pt	

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

J.D.Est.Obs.

TY AQL
190907
975 10.8 Bw
975 10.3 Me
977 10.4 Me
978 10.4 Me
980 10.3 Me
982 10.3 Me
983 10.5 Me
984 10.1 Pt
984 10.2 Me
985 10.2 Me
986 10.5 Me
S LYR
190925
957[14.4 L
984[12.9 Pt
X LYR
190926
974 9.2 Pt
984 9.0 Pt
RS LYR
190933a
974 11.4 Gy
976 11.3 Gy
974 11.8 Pt
984 10.5 Pt
RU LYR
190941
974[13.8 Pt
984[12.3 Pt
U DRA
190967
915 9.5 Ch
940 10.8 Ch
957 11.6 L
969 12.0 Me
974 11.8 Pt
984 12.0 Pt
W AQL
191007
949 10.7 Ch
956 10.5 Vh
957 10.5 L
966 11.5 Wi
966 11.5 Bk
967 11.1 Me
969 11.7 Bw
974 11.5 Pt
975 11.7 Bw
984 11.4 Me
984 11.8 Pt
T SGR
191017
949 12.8 Ch
969 12.2 Me
974 12.5 Pt
984 12.2 Pt

J.D.Est.Obs.

R SGR
191019
923 10.4 Ht
924 10.6 En
928 9.9 Ht
939 9.6 En
940 9.2 Ht
945 8.6 Ht
949 8.5 Ch
954 7.7 Ko
957 7.6 L
963 7.2 Ko
965 7.7 Me
972 7.6 El
973 7.4 Ko
974 7.4 Pt
975 7.6 Si
977 7.5 We
979 7.5 Si
980 7.5 Me
984 7.2 Pt
RY SGR
191033
920 7.0 Bl
923 7.2 Ht
924 6.9 En
928 6.9 Ht
936 6.5 Bl
937 6.5 En
939 6.6 En
940 6.9 Ht
940 7.3 Ch
941 6.7 Sl
945 6.9 Ht
947 6.7 Bl
951 6.9 En
953 7.4 Gt
953 7.3 Be
953 7.5 An
953 7.5 L
956 7.6 L
956 7.3 An
956 7.4 Be
956 7.4 Ch
957 7.5 An
967 7.0 Be
967 7.1 L
967 6.7 Me
967 6.5 Pt
968 7.0 L
968 7.2 An
974 6.6 Pt
975 6.7 Pt
979 6.8 Pt
980 6.8 Pt
981 6.8 Pt
984 6.8 Pt
986 6.8 Pt
988 6.8 Pt

J.D.Est.Obs.

TY SGR
191124
920 12.2 Bl
947 13.0 Bl
S SGR
191319a
920 11.7 Bl
923 11.8 Ht
924 12.0 En
984[12.9 Pt
Z SGR
191321
925[12.2 En
940[13.1 En
SW SGR
191331
920[12.9 Bl
TZ CYG
191350
965 11.4 Wi
974 11.3 Pt
984 11.0 Pt
984 11.1 Me
U LYR
191637
953 9.7 Jo
957 9.8 Jo
965 10.0 Wi
967 10.8 Mc
974 10.8 Pt
976 9.8 Jo
979 10.3 Jo
984 10.8 Pt
AF CYG
192745
954 7.3 Ah
957 7.3 Ah
968 7.2 Ah
980 7.5 Ah
TY CYG
192928
912[13.0 Ch
974[13.0 Pt
984[13.0 Pt
RT AQL
193311
899 9.4 Ch
956 11.2 Ah
961 11.1 Ma
967 11.4 Be
967 11.4 L
974 11.5 Pt
984 11.8 Pt
R CYG
193449
912 13.5 Ch
953 9.0 Jo
954 10.2 Ah
957 10.0 Ah
959 10.1 Ma

J.D.Est.Obs.

R CYG
193449
960 8.9 Jo
965 9.4 Wi
967 9.7 Ko
967 9.7 Me
969 9.7 Wd
969 9.5 Ie
970 9.7 Hf
970 9.6 Wd
970 10.0 Ah
974 9.5 We
974 9.8 Gy
976 9.0 Jo
978 8.9 El
979 9.6 Ko
979 9.8 Gy
979 8.8 Jo
979 9.1 Pt
980 9.3 Wd
980 9.4 Hf
980 9.5 Ah
984 9.0 Wd
985 8.9 Wd
985 9.0 Hf
986 8.7 Pt
990 8.8 Wd
990 8.7 Hf
RV AQL
193509
899 9.2 Ch
967 12.8 L
979 13.0 Pt
986 13.0 Pt
T PAV
193072
921 11.2 Bl
923 11.3 Ht
924 11.2 En
928 10.7 Ht
937 9.4 Bl
939 9.5 Ht
940 9.4 En
946 8.8 Ht
947 9.0 Bl
951 8.9 En
RT CYG
194048
899 6.9 Ch
940 8.0 Ch
953 8.8 Jo
954 9.3 Ah
957 9.3 Ah
960 9.1 Jo
965 9.9 Wi
967 9.5 Ko
967 10.3 Me
969 10.0 Wd
970 10.8 Ah
974 11.0 Gy

J.D.Est.Obs.

RT CYG
194048
976 11.7 Jo
978 11.2 El
979 11.2 Gy
979 11.9 Jo
979 11.0 Pt
980 11.6 Hf
980 11.5 Wd
984 11.6 Wd
986 11.6 Pt
TU CYG
194348
940 11.0 Ch
953 10.6 Jo
959 10.3 Ma
960 9.5 Jo
965 9.8 Wi
967 10.1 Me
976 9.4 Jo
979 9.8 Jo
979 9.8 Pt
986 9.6 Pt
X AQL
194604
912 11.0 Ch
944 9.1 Hi
952 8.8 Th
953 8.8 Jo
954 9.1 Ah
955 8.8 Th
957 9.0 Jo
959 8.7 Th
960 9.0 Jo
967 9.2 Ah
967 9.5 L
967 9.4 Be
969 9.2 Th
969 9.5 Sf
970 9.3 Jo
970 9.3 Hi
971 8.8 We
972 9.1 Mc
975 9.7 Sf
976 9.1 Jo
978 9.8 Hi
978 9.4 Mc
979 9.6 Th
979 9.2 Jo
979 9.7 Pt
983 10.0 Sf
986 9.5 Pt
χ CYG
194632
907 11.3 Mg
912 11.6 Ch
949 10.6 Ch
953 9.9 Jo
956 10.1 Ah
959 9.6 Ma

J.D.Est.Obs.

χ CYG
194632
960 9.3 Jo
961 9.7 Ko
967 10.3 Mg
967 9.6 Me
969 9.6 Wd
970 9.5 Ah
971 9.1 Ko
974 9.4 Gy
976 8.9 Gy
976 8.8 Wd
976 8.6 Jo
977 9.0 Mg
978 8.5 El
979 8.7 Sh
979 8.3 Jo
979 8.4 Pt
979 8.9 Gy
980 8.0 Ko
980 8.4 Ah
981 8.1 Th
984 7.9 Wd
986 7.5 Pt
990 7.5 Ad
S PAV
194659
925 7.8 En
940 7.9 En
RR SGR
194929
921[13.2 Bl
940[12.2 En
RU SGR
195142
921 14.0 Bl
940 12.6 En
945 13.0 Ht
946 12.5 En
947 12.3 Bl
951 12.1 En
RR AQL
195202
912 13.2 Ch
RS AQL
195308
957 11.0 Jo
967 10.7 Be
967 10.7 L
978 10.0 We
Nov CYG
195553
912[13.2 Ch
986[12.2 Pt
RR TEL
195656
940[12.6 En
945[12.6 Ht

Variable Star Observations Received During October, 1932.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
Z Cyg	**RW Aql**	**RS Cyg**	**WX Cyg**	**U Cyg**	**S Del**
195849	200715b	200938	201437b	201647	203816
899 9.5 Ch	979 9.5 Pt	979 8.9 Wd	913 10.7 Ch	979 9.0 Jo	979 9.8 Sz
940 10.8 Ch	986 9.0 Pt	980 8.2 Ko	953 9.0 Jo	979 9.2 Pt	979 9.5 Jo
953 11.8 Jo	**R Tel**	981 8.2 GD	956 10.4 Cy	979 10.2 Sh	979 9.4 Pt
960 12.0 Jo	*200747*	985 9.0 Wd	956 10.4 Ah	979 10.2 Wd	986 9.5 Pt
979 12.6 Pt	921 12.7 Bl	985 9.0 Hf	957 10.6 Ah	980 10.4 Hf	**V Cyg**
985 12.6 Me	925 11.9 En	986 8.0 Pt	957 10.4 L	980 10.1 Mn	203847
986 12.5 Pt	937 10.8 Bl	993 8.8 Wd	960 9.0 Jo	985 10.3 Wd	913[13.0 Ch
S Tel	940 10.1 En	993 8.8 Hf	961 11.2 Ko	985 10.5 Hf	957 13.6 L
195855	947 8.9 Bl	**R Del**	967 10.3 Cy	986 9.2 Pt	959 13.2 Ma
920 12.6 En	**RU Aql**	201008	967 10.2 Me	**U Mic**	979[13.0 Pt
921 13.1 Bl	200812	944 8.5 Hl	969 10.4 Wd	*202240*	986[13.0 Pt
923 12.8 Ht	913[13.0 Ch	949 8.5 Jo	971 10.5 Md	921 12.9 Bl	**Y Aqr**
941 12.8 Ht	959[13.7 Ma	952 8.8 Th	971 11.4 Ko	947 13.6 Bl	*203005*
945 12.7 Ht	971[13.8 Br	953 8.7 L	974 10.3 Cy	**RU Cap**	976 12.5 Jo
SY Aql	981[13.8 Br	954 9.0 Ah	976 9.4 Jo	*202622*	979 12.0 Jo
200212	**W Cap**	957 8.9 An	978 10.8 Md	925[12.0 En	**T Del**
953 12.1 An	*200822*	957 8.8 Ko	979 9.4 Jo	940[12.0 En	204016
953 12.2 Gt	979 12.5 Pt	957 9.3 Cy	979 10.9 Pt	**Z Del**	953 13.6 An
953 12.3 L	986 12.3 Pt	957 9.0 Ah	980 11.3 Ko	202817	953 13.7 Be
974 9.4 Gy	**Z Aql**	957 8.6 Jo	986 10.6 Pt	913[13.1 Ch	953 12.9 Gt
976 9.5 Gy	*200906*	958 8.8 We	**V Sge**	959[13.1 Ma	953 13.7 L
977 9.4 Md	913 10.6 Ch	959 9.1 Th	201520	972[14.4 Br	975 12.6 Cy
979 9.2 Pt	972 12.2 Bw	959 9.0 Jo	966 12.0 Me	986[12.9 Pt	976 12.7 Ie
985 8.9 Me	979 13.4 Pt	967 9.5 Th	967 11.9 Me	**ST Cyg**	979 13.0 Pt
986 8.9 Pt	986 13.1 Pt	967 9.0 Ko	969 11.9 Me	202954	986 12.5 Pt
S Cyg	**R Sge**	967 9.3 Ah	970 11.8 Me	913 13.0 Ch	**V Aqr**
200357	200916	967 9.1 Me	971 11.9 Br	953 13.2 L	204102
912 13.0 Ch	953 9.3 Jo	969 9.5 Sf	972 11.9 Me	971 13.4 Br	968 9.0 An
978 10.7 El	960 8.9 Jo	970 9.4 Cy	974 12.0 Me	979 13.5 Ie	968 8.8 L
979 11.2 Pt	967 9.1 Me	972 9.3 El	975 11.5 Me	979 13.3 Pt	971 9.6 Md
986 10.6 Pt	976 9.2 Jo	975 9.7 Sf	977 11.5 Me	984 13.5 Br	978 9.2 Md
R Cap	**RS Cyg**	976 9.7 Ko	978 11.4 Me	986 13.7 Pt	979 8.5 Pt
200514	200938	979 9.8 Th	980 11.4 Me	**V Vul**	986 8.2 Pt
913 11.8 Ch	899 7.8 Ch	979 9.5 Pt	982 10.9 Me	203226	**W Aqr**
949 10.8 Ch	913 7.8 Ch	983 10.1 Sf	983 10.8 Me	979 8.9 Pt	*204104*
968 11.4 L	939 8.7 Cy	983 10.0 Br	983 10.9 Br	986 8.6 Pt	959 11.6 Cy
968 11.4 An	940 8.4 Ch	986 9.8 Pt	984 11.2 Me	**R Mic**	975 11.7 Cy
979 11.4 Pt	949 8.8 Cy	988 10.5 El	985 11.1 Me	*203429*	**U Cap**
986 11.1 Pt	956 8.9 Cy	996 10.6 My	986 11.3 Me	921 11.1 Bl	*204215*
S Aql	956 7.9 Ah	**RT Cap**	**U Cyg**	925 11.0 En	949 12.0 Ch
200715a	956 8.8 Ch	*201121*	201647	937 10.2 Bl	972 11.7 El
913 11.4 Ch	957 8.0 Ah	979 6.5 Pt	913 9.3 Ch	940 9.7 En	**V Del**
952 11.8 Vh	957 7.9 L	986 6.6 Pt	953 9.8 Mn	947 9.4 Bl	204318
953 11.7 Jo	958 8.0 We	**SX Cyg**	953 7.9 Jo	967 10.4 Me	959[14.4 Ma
956 12.0 Ah	959 7.5 Ad	201130	956 9.6 Ah	**Y Del**	971[13.9 Br
957 11.7 An	960 7.6 Jo	913 12.1 Ch	956 9.0 We	203611	981[13.9 Br
960 11.0 Jo	961 8.1 Ko	971 12.9 Br	958 9.9 Mn	959 13.8 Ma	**T Aqr**
967 12.2 Me	967 8.7 Cy	979 13.5 Ie	959 7.4 Ad	971 13.8 Br	*204305*
976 10.7 Jo	969 8.8 Wd	980 13.5 Bw	960 8.8 Jo	977 13.9 Br	953 11.5 Jo
977 9.8 We	970 8.8 Wd	**RT Sgr**	964 9.1 Ko	**S Del**	956 11.5 Ah
979 11.1 Pt	970 8.7 Hf	*201139*	965 9.9 Mn	203816	957 11.2 An
980 10.2 Me	971 8.2 Ko	921 11.9 Bl	969 9.8 Wd	953 9.7 Jo	957 11.2 Jo
986 9.7 Pt	973 8.8 Bc	925 12.1 En	970 10.0 Mn	956 10.0 Ah	969 9.8 Jo
RW Aql	974 8.9 Cy	937 12.1 Bl	972 8.0 GD	960 9.4 Jo	976 9.3 Jo
200715b	976 7.8 Jo	940 12.5 En	973 9.8 Mc	967 9.9 Me	979 9.3 Jo
953 9.4 Jo	979 7.8 Jo	947 12.7 Bl	974 10.0 Md	971 9.9 Md	979 9.5 Pt
960 9.2 Jo	979 7.8 Pt		975 10.5 Ko	976 9.6 Jo	986 8.6 Pt
976 9.2 Jo	979 8.8 Sh		976 9.0 Jo	978 9.6 Md	

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs.

RZ CYG
204846
979 12.3 Pt
981 12.6 Br
986 13.1 Pt

S IND
204954
946 12.9 Ht

X DEL
205017
979 12.5 Pt
983 12.8 Br
986 13.0 Pt

UX CYG
205030a
971 14.2 Br
983 14.3 Br

RR CAP
205627
925 10.8 En
940 11.5 En
986[13.8 Me

R VUL
205923a
976 10.6 Md
976 11.3 Jo
979 11.0 Jo
979 10.4 Pt
986 10.0 Pt

V CAP
210124
921 11.1 Bl
926 11.7 En
942 12.5 En
947 12.8 En

TW CYG
210129
971 13.0 Br
976 13.2 Ie
983 13.5 Br

X CAP
210221
921[12.7 Bl
947[12.7 En
979 11.7 Pt
986 11.6 Pt

X CEP
210382
971[13.9 Br
983[14.6 Br

RS AQR
210504
979 10.9 Pt
986 10.8 Pt

Z CAP
210516
986 11.1 Pt

R EQU
210812
959 13.5 Ma
972 12.7 Br
979 12.7 Pt
985 12.2 Me
986 12.0 Pt

T CEP
210868
940 10.1 Ch
952 9.7 Th
953 9.8 Mn
953 9.0 Jo
954 9.6 Ah
958 9.6 Mn
960 9.0 El
963 8.4 Ko
965 9.3 Mn
969 9.6 Si
969 8.7 Wd
970 9.1 Mn
973 8.4 El
973 8.0 Ko
976 7.7 Jo
976 8.8 Mn
976 8.5 Gy
979 8.6 Th
979 8.4 Wd
979 8.2 Sh
979 7.6 Jo
979 8.1 Pt
980 8.5 Ah
980 8.8 Mn
981 7.8 Ko
982 7.8 El
985 8.3 Wd
985 8.3 Hf
986 7.9 Pt
990 8.1 Wd
990 8.2 Hf

RR AQR
210903
957 11.2 An
957 11.1 L
972 11.2 Bw
979 11.3 Pt
986 11.4 Pt

Y PAV
211570
923 6.1 Ht
928 6.4 Ht
939 6.1 Ht
946 5.8 Ht

X PEG
211614
957 9.6 L
959 10.0 Ma

X PEG
211614
970 9.6 Io
979 9.8 Pt
979 9.5 Wa
983 9.8 Br
986 10.0 Pt

T CAP
211615
921 11.6 Bl
937 11.7 Bl
947 11.6 Bl
949 12.7 Ch

S MIC
212030
921 10.4 Bl
924 10.3 En
937 10.8 Bl
942 12.0 En
947 12.7 En
947 12.2 Bl

Y CAP
212814
921[13.1 Bl
949[13.1 Ch

W CYG
213244
956 6.7 Si
957 6.6 L
969 6.3 Si
973 6.4 Mc
981 6.4 Mc

S CEP
213678
950 11.5 Wr
953 11.5 Jo
956 11.5 Ch
959 11.2 Cy
974 11.1 Cy
975 11.3 Me
976 9.2 Jo
977 11.1 Md
979 9.8 Wa
979 10.5 Pt
986 10.4 Pt

RU CYG
213753
928 7.7 Cy
941 9.0 Cy
949 8.1 Cy
952 7.7 Th
953 7.6 Jo
954 7.7 Th
954 7.9 Ah
956 7.9 Th
957 7.8 Th
957 8.3 Cy
957 8.0 Ah
960 7.5 Jo
967 8.0 Me

RU CYG
213753
967 8.0 Ah
967 8.0 Cy
973 9.3 Mc
974 8.2 Cy
979 8.5 Th
979 8.2 Pt
986 8.0 Pt
988 8.6 Bw
999 8.1 My

RV CYG
213937
979 6.6 Pt
986 6.6 Pt

RR PEG
214024
957[14.1 Ma
961[14.8 FO
979[12.6 Md
983[14.1 Br
986[13.0 Pt

R GRU
214247
921[13.7 Bl
927[12.9 Ht
947[12.9 En

V PEG
215605
953 9.3 Ch
956 8.7 We
967 8.8 Be
967 8.9 L
970 9.5 Jo
976 9.5 Md
979 9.4 Pt
983 9.4 Br
986 9.5 Pt

U PSA
215628
926[12.2 En
947[12.2 En

U AQR
215717
955 11.9 Ch
979 11.7 Pt
986 11.7 Pt

S PSA
215828
926 10.4 En
942 11.5 En
947 12.1 En

RT PEG
215934
961 14.3 FO
972[13.0 Br
983[13.0 Br

RY PEG
220133a
961 13.2 FO

RY PEG
220133a
979 13.5 FO
973 12.7 Pt
979 8.5 Th
961 10.5 FO
979 10.8 FO
979 11.0 Pt
986 11.5 Pt
988 12.0 Bw

RZ PEG
220133b
953 10.2 L
961 10.5 FO
986 11.5 Pt

T PEG
220412
953 13.4 L
961 14.2 FO
979 14.5 FO

Y PEG
220613
961 14.6 FO
999 15.2 Wi

RS PEG
220714
953 12.9 L
961 12.3 FO
976 10.1 Md
979 9.8 FO
979 9.8 Pt
986 9.0 Pt
999 9.3 Wi

R PSA
221230
926[12.0 En
947[12.9 En

X AQR
221321
942[12.4 En
947[12.4 En

T GRU
221938
942 9.6 En
947 9.8 En

S GRU
221948
923 6.8 Ht
925 7.0 En
928 6.4 Ht
939 6.0 Ht
940 6.0 En
946 6.0 Ht
947 6.0 En

RV PEG
222129
953 13.6 L
961 14.0 FO
983[13.7 Br

S LAC
222439
972 12.9 Br
973 12.9 El
979 12.4 Pt
982 12.7 El
984 12.1 Br
986 12.4 Pt

R IND
222867
921 11.2 Bl
923 11.5 Ht
937 12.3 Bl
941 13.1 Ht
942 12.6 En
946 13.5 Ht
947 13.0 En
947 13.0 Bl

T TUC
223462
923 8.2 Ht
928 8.2 Ht
941 8.4 Ht
942 9.1 En
946 9.1 Ht
947 9.2 En

R LAC
223841
957 14.4 L
961 14.2 FO
972 13.8 Br
984 14.4 Br

S AQR
225120
951 8.0 En

RW PEG
225914
949 10.3 Jo
953 10.6 L
953 10.6 Ch
955 10.3 We
956 10.6 An
956 10.5 Be
957 10.8 Ma
957 10.3 Jo
961 11.1 FO
970 10.7 Jo
979 12.2 Pt
983 12.3 Wa
984 12.5 Br
986 12.3 Pt

R PEG
230110.
953 7.2 Ch
954 7.3 Ah
957 7.4 Ah
958 8.0 We
961 7.1 FO
967 7.7 Ah
970 8.1 Ah

Variable Star Observations Received During October, 1932.

J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs.

R Peg
230110
970 7.8 Sf
974 8.3 Gy
974 9.2 We
975 8.4 Sf
979 8.3 Gy
979 8.4 Pt
980 8.3 Ah
981 7.8 GD
983 8.4 Sf
984 9.0 Sr
986 8.5 Pt
993 8.8 Wd
993 8.9 Hf
996 9.0 My

V Cas
230759
949 8.3 Jo
952 7.8 We
953 7.8 Jo
953 7.8 Ch
954 8.1 Ah
956 8.3 Cy
957 8.0 Ko
957 8.1 Ah
960 7.8 Jo
967 8.2 Me
967 8.5 Ah
967 8.7 Cy
967 8.0 Ko
968 8.0 Jo
969 8.9 Si
970 9.0 Sf
971 8.3 Jo
975 9.4 Sf
976 8.4 Jo
976 8.9 Cy
979 8.9 Ko
979 8.7 Jo
979 9.3 Pt
980 9.5 Sf
986 9.9 Pt

W Peg
231425
949 9.7 Jo
953 10.0 Jo
953 10.1 Ch
956 10.5 Ah
957 10.0 Jo
967 11.1 L
968 10.8 An
968 10.7 Jo
970 10.5 Jo
970 11.0 Cy
976 10.6 Jo
979 10.7 Jo
983 11.8 Bw

S Peg
231508
951 11.6 Cy
953 12.1 Ch
956 11.9 Be
956 11.9 An
956 11.5 Ah
956 11.9 L
958 11.9 Cy
961 12.2 FO
970 11.4 Cy
973 11.2 Br
979 11.5 Pt
986 11.5 Pt

RY Cep
231878
956 9.8 Ch

V Phe
232746
923 9.0 Ht
939 9.3 Ht
942 9.2 En
946 9.4 Ht
947 9.5 En

Z And
232848
954 10.7 Ko
955 10.7 Ch
956 10.3 Cy
957 10.7 Ma
961 10.6 Cy
967 10.7 Ko
968 10.6 Cy
970 10.7 Me
970 11.0 Sr
973 10.7 Bw
974 10.8 Md
974 10.5 Cy
976 10.7 Ko
979 10.7 Pt
985 10.9 Sr
986 10.7 Pt

ST And
233335
940 11.1 Ch
949 10.7 Jo
953 10.6 Jo
956 10.5 Ah
957 10.9 Ah
958 10.7 Cy
960 10.5 Jo
965 10.8 My
968 10.7 Cy
968 10.8 Jo
976 10.3 Jo
976 11.2 Cy
979 10.4 Jo
979 11.0 Pt
983 10.8 My
986 10.4 Pt
991 10.6 My

R Aqr
233815
921 7.8 Bl
923 7.8 Ht
937 8.0 Bl
941 7.9 Ht
946 7.8 Ht
947 8.0 Bl
949 8.1 Jo
953 8.2 Jo
954 8.1 Bc
955 8.1 Bc
955 8.1 Bf
956 7.9 An
956 7.6 Be

R Aqr
233815
956 8.1 Bc
956 7.6 L
956 7.9 Ch
957 8.3 Ma
957 8.3 Jo
958 7.6 We
959 7.6 Ad
959 8.0 Bc
959 8.1 Ko
961 8.1 Bc
961 8.1 Jo
967 8.4 Ko
968 8.2 Bc
970 8.1 We
970 8.4 Me
970 8.3 Jo
971 8.2 Bf
971 8.2 Bc
972 8.1 Bc
972 8.5 Bf
974 8.5 Bc
975 8.5 Bc
975 8.4 Bf
975 8.4 Ko
978 8.4 Bc
979 8.4 Bc
979 8.4 Jo
979 8.4 Pt
979 8.4 Bf
980 8.4 Bf
980 8.4 Bc
986 8.5 Pt

Z Cas
233956
953 9.4 Jo
955 10.1 Ch
956 9.6 L
961 9.5 FO
968 9.4 Jo
977 10.0 Mg

TX Cep
234875
945 13.5 Br
956 13.5 Br
973 14.0 Br

RR Cas
235053
951 12.7 Bn
953 11.9 Jo
957 11.8 Jo
957 13.0 Bn
960 12.5 Bn
961 11.6 FO
961 11.8 Jo
977 11.3 Bn

R Phe
235150
947[12.7 En

V Cet
235209
961 14.7 FO

R Tuc
235265
942[12.9 En
946[13.0 Ht

R Cas
235350
949 8.7 Jo
953 8.6 Jo
953 9.8 Ch
953 9.6 Mn
954 9.3 Ah
958 9.6 Mn
961 9.0 Jo
965 9.7 Mn
968 9.3 Jo
969 9.8 Wd
969 9.8 Hf
970 9.9 Hf
970 9.9 Wd
970 9.7 Mn
974 10.0 Gy
976 9.6 Mn
977 10.0 Wd
979 10.0 Wd
979 10.2 Hf
979 9.9 Sh

R Cas
235350
979 10.1 We
979 10.0 Gy
979 9.6 Jo
980 9.7 Mn
985 10.6 Wd
985 10.5 Hf

Z Peg
235525
956 13.2 L
961 13.2 FO
973 12.8 Br
976 12.5 Gy
977 11.4 Jo
979 12.4 Pt
986 12.3 Pt

W Cet
235715
952 6.7 We
957 8.4 Ko
971 9.4 Ko
971 9.1 Jo
979 9.6 Ko

Y Cas
235855
956 12.7 L
961 12.8 FO
973 13.3 Br
983 13.6 Br

SV And
235939
953 11.6 Jo
957 12.3 Ma
957 12.5 Md
957 12.5 An
961 12.5 FO
973 12.1 Br
976 11.7 Cy
979 11.6 Pt
986 11.6 Pt

Rapidly Varying Irregular Variables.

Star	J.D.	Est.Obs.	J.D.	Est.Obs.	Star	J.D.	Est.Obs.	J.D.	Est.Obs.
005840 RX Andromedae—					005840 RX Andromedae—				
	6967.6	11.5 Me	6972.7	12.7 Mc		6977.8	13.5 Me	6982.7	13.0 Me
	6968.6	10.9 Ko	6972.8	13.0 Br		6978.7	13.6 Me	6982.9	13.0 Me
	6968.7	11.5 Me	6973.8	13.5 Br		6978.7	13.0 Pt	6983.7	12.2 Me
	6969.6	11.3 Me	6974.7	13.0 Me		6979.7	13.0 Pt	6983.7	12.0 Pt
	6970.6	11.7 Me	6974.7	13.0 Pt		6980.6	13.5 Me	6983.8	12.4 Br
	6970.6	11.2 Ko	6975.7	13.0 Pt		6980.7	13.0 Pt	6984.7	11.6 Br
	6971.6	12.0 Ko	6975.7	13.4 Me		6981.7	12.8 Pt	6984.7	12.1 Me
	6971.8	11.8 Br	6977.7	13.8 Br		6981.8	13.5 Br	6984.8	12.1 Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

Star	J.D.	Est.	Obs.	J.D.	Est.	Obs.
005840 RX ANDROMEDAE—						
	6985.6	12.0	Me	6987.9	11.1	Me
	6986.7	11.7	Me	6988.9	11.3	Pt
	6986.7	11.9	Pt	6989.8	11.3	Pt
060547 SS AURIGAE—						
	6956.6	14.8	L	6979.8	11.0	Ko
	6957.6	14.8	L	6980.7	10.7	Pt
	6958.6[	13.9	L	6981.4	10.6	L
	6959.7[	12.5	Cy	6981.6	11.1	Ko
	6960.6	14.1	L	6981.7	11.2	Pt
	6961.9[	12.5	Cy	6982.1	11.6	El
	6963.6[	13.9	L	6982.7	11.5	Me
	6965.8[	12.5	Pt	6983.8	12.3	Pt
	6968.8[	11.5	Pt	6983.9	12.1	Br
	6974.7[	12.4	Gy	6984.7	12.1	Me
	6975.9[	12.5	Pt	6984.7	12.5	Pt
	6976.7[	12.4	Gy	6985.7	12.7	Me
	6977.9	14.5	Br	6986.1	13.2	El
	6978.1[	13.2	El	6986.7	13.1	Me
	6978.8[	12.6	Pt	6987.8[	12.6	Pt
	6979.7	11.1	Cy	6988.0[	13.9	Me
	6979.7	11.9	Pt	6989.8[	12.5	Pt
074922 U GEMINORUM—						
	6953.6[	11.4	L	6982.9[	12.7	Me
	6958.6[	13.3	L	6983.8[	12.4	Pt
	6960.6[	11.4	L	6984.9[	12.3	Pt
	6961.9[	12.4	Cy	6987.9[	13.8	Me
	6963.6[	12.4	L	6988.9[	12.4	Pt
	6976.9	10.9	Cy	6989.8[	11.8	Pt
	6978.8[	12.4	Pt			
081473 Z CAMELOPARDALIS—						
	6953.3	13.1	L	6974.7	11.4	Cy
	6953.3	13.2	An	6974.7	11.2	Gy
	6953.3	12.5	Gt	6974.7	11.5	Pt
	6953.3	13.0	Be	6975.6	11.7	Ko
	6954.4	13.1	L	6975.7	11.9	Me
	6956.3	12.4	Gt	6975.7	11.6	Pt
	6956.4	13.1	L	6976.6	12.2	Ko
	6956.8	13.2	Cy	6976.7	12.1	Cy
	6957.4	13.2	L	6976.7	12.0	Gy
	6957.4	12.9	An	6977.8	12.5	Me
	6957.4	13.1	Be	6978.7	12.7	Me
	6958.4	13.1	L	6978.8	13.0	Pt
	6960.4	13.1	L	6979.7	13.0	Pt
	6963.6	13.1	L	6979.7	12.8	Cy
	6966.3	13.1	L	6980.6	12.8	Me
	6967.4	12.9	L	6980.7	13.0	Pt
	6968.4	11.8	L	6981.3	13.1	L
	6968.4	11.7	An	6981.7	12.8	Pt
	6968.8	11.0	Pt	6982.7	12.8	Me
	6969.3	10.6	L	6982.9	13.0	Me
	6969.6	11.0	Me	6983.7	12.8	Me
	6970.3	10.4	Be	6984.7	12.5	Me
	6970.3	10.4	L	6984.7	12.1	Pt
	6970.6	10.6	Me	6985.7	12.9	Me
	6971.3	10.9	An	6986.7	12.2	Pt
	6972.7	11.0	Me	6986.7	12.9	Me
	6974.7	11.4	Me	6987.8	12.2	Pt
081473 Z CAMELOPARDALIS—						
	6987.9	12.9	Me	6989.8	11.8	Pt
	6988.7	12.2	Pt			
094512 X LEONIS—						
	6984.9[	12.6	Pt	6988.9[	12.6	Pt
202946 SZ CYGNI—						
	6965.8	9.5	Pt	6980.7	9.6	Pt
	6967.7	9.6	Pt	6981.7	9.5	Pt
	6968.8	9.7	Pt	6983.8	9.6	Pt
	6974.7	8.9	Pt	6984.7	9.6	Pt
	6975.7	9.2	Pt	6986.7	9.2	Pt
	6976.7	9.4	Pt	6987.8	9.0	Pt
	6978.8	9.1	Pt	6988.7	8.7	Pt
	6979.7	9.6	Pt	6989.8	8.9	Pt
213843 SS CYGNI—						
	6899.2	11.8	Ch	6959.4	11.6	Be
	6907.6	11.9	Mg	6959.4	11.4	An
	6915.1	9.7	Ch	6959.4	11.6	L
	6917.7	8.4	Mg	6959.6	11.9	Ko
	6922.7	9.5	Mg	6959.6	12.0	Bc
	6945.9	12.5	Ma	6959.6	11.9	Cy
	6949.6	12.0	Jo	6959.8	12.3	Ma
	6950.1	12.1	Ch	6960.3	11.6	L
	6953.3	11.9	An	6960.6	12.0	Ko
	6953.3	12.0	Be	6960.6	11.9	Cy
	6953.3	11.9	Gt	6960.6	11.8	Jo
	6953.4	12.0	L	6961.6	11.9	Jo
	6953.6	12.1	L	6961.6	11.9	Ko
	6953.6	12.0	Cy	6961.7	12.0	FO
	6953.6	12.0	Jo	6961.8	12.0	Bc
	6954.3	11.8	Ah	6961.8	12.0	Bf
	6954.4	11.8	L	6961.8	12.0	Ma
	6954.6	12.0	Ko	6961.9	11.9	Cy
	6954.7	12.0	Bc	6963.6	12.0	L
	6955.7	12.0	Bc	6964.8	12.0	Ma
	6955.7	12.0	Bf	6965.8	11.7	Pt
	6955.7	11.9	Cy	6966.3	11.5	L
	6956.3	11.6	L	6966.6	11.9	Me
	6956.3	11.8	An	6966.8	11.6	Bk
	6956.3	11.6	Be	6967.3	11.5	L
	6956.3	12.0	Gt	6967.3	11.8	Ah
	6956.5	12.0	Ah	6967.3	11.6	Be
	6956.6	12.0	Bc	6967.5	11.7	Cy
	6956.6	11.9	L	6967.6	11.6	Me
	6956.7	11.5	Vh	6967.6	11.6	Ko
	6956.8	11.9	Cy	6967.7	11.9	Mg
	6957.1	11.8	Ch	6967.7	11.7	Pt
	6957.3	12.0	L	6968.3	11.2	An
	6957.3	11.9	An	6968.5	12.1	Wa
	6957.4	11.9	Ah	6968.6	11.8	Ah
	6957.6	11.8	Jo	6968.6	11.8	Cy
	6957.6	11.9	Ko	6968.6	11.8	Jo
	6957.6	11.9	L	6968.6	11.6	Ko
	6957.7	11.9	Cy	6968.7	11.3	Me
	6957.8	11.9	Ma	6968.7	12.0	Bc
	6958.4	12.1	L	6968.8	11.6	Pt
	6958.6	12.1	L	6969.3	11.1	L
	6958.9	11.9	Cy	6969.5	11.5	Sf

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

Star	J.D.	Est.Obs.	J.D.	Est.Obs.	Star	J.D.	Est.Obs.	J.D.	Est.Obs.
213843 SS CYGNI—					213843 SS CYGNI—				
	6969.5	11.8 Wa	6975.5	11.5 Sf		6979.6	11.8 Ko	6983.9	11.9 Ma
	6969.6	11.1 L	6975.6	11.7 Cy		6979.7	11.6 Md	6984.5	11.8 Sf
	6969.6	11.6 Me	6975.6	11.9 Jo		6979.7	11.7 Pt	6984.6	11.5 Wd
	6970.3	10.9 L	6975.6	11.6 Ko		6979.7	11.8 Ae	6984.7	11.7 Br
	6970.3	11.0 Be	6975.7	11.3 Me		6980.4	11.9 Ah	6984.7	11.6 Pt
	6970.4	12.0 Ah	6975.7	11.7 Pt		6980.5	11.7 Sf	6984.7	11.5 Me
	6970.5	11.7 Sf	6975.7	11.8 Bc		6980.6	11.6 Me	6985.6	11.8 Me
	6970.6	11.8 Cy	6975.7	11.8 Bf		6980.7	11.6 Hf	6985.7	11.7 Br
	6970.6	11.8 Jo	6976.5	11.5 Sf		6980.6	11.7 Ko	6986.1	12.0 El
	6970.6	12.0 Ko	6976.6	11.6 Ko		6980.6	11.8 Bc	6986.7	11.7 Pt
	6970.6	11.5 Me	6976.6	12.0 Jo		6980.6	11.8 Bf	6986.7	11.5 Me
	6970.7	11.8 Me	6976.7	11.5 Cy		6980.7	11.8 Pt	6987.8	11.6 Pt
	6971.3	11.5 An	6976.7	11.7 Pt		6980.7	11.5 Wd	6987.9	11.6 Me
	6971.6	11.8 Ko	6977.6	11.8 Mg		6980.8	11.7 Ma	6988.1	11.6 El
	6971.7	11.5 Mg	6977.7	11.5 Br		6981.2	11.5 L	6988.7	11.7 Pt
	6971.7	11.8 Bc	6977.8	11.7 Me		6981.5	11.9 Wa	6988.8	11.7 Ma
	6971.7	11.9 Bf	6978.1	11.7 El		6981.6	11.6 Bc	6989.8	11.7 Pt
	6971.7	11.7 Br	6978.7	11.8 Bc		6981.6	11.7 Ko	6990.7	11.5 Me
	6972.6	11.8 Bc	6978.7	11.5 Me		6981.7	11.7 Pt	6993.6	11.8 Wd
	6972.7	11.5 Br	6978.7	11.8 Md		6981.8	11.6 Br	6993.6	11.8 Hf
	6972.7	11.3 Me	6978.8	11.8 Pt		6982.1	12.0 El	6996.6	11.6 Hu
	6972.7	11.5 Md	6979.5	11.7 Sf		6982.7	11.6 Me	6996.6	11.1 My
	6973.6	11.8 Bc	6979.6	11.6 Sz		6982.9	11.5 Me	6997.6	8.6 My
	6973.6	11.6 Ko	6979.6	11.3 Sh		6983.5	11.2 My	7001.8	8.4 Ae
	6973.7	11.5 Br	6979.6	12.1 Wa		6983.5	11.6 Sf	7002.6	8.3 Ae
	6974.6	11.6 Cy	6979.6	11.3 Wd		6983.5	11.7 Wa	7003.7	8.3 Ae
	6974.7	11.8 Bc	6979.6	11.8 Bc		6983.7	11.5 Me		
	6974.7	11.5 Me	6979.6	11.8 Bf		6983.7	11.5 Br		
	6974.7	10.9 Pt	6979.6	11.8 Jo		6983.8	11.7 Pt		

SUMMARY FOR OCTOBER, 1932.

Observer	Initial	Vars.	Observations	Observer	Initial	Vars.	Observations
Ahnert	Ah	55	132	Hildom, L.	Hl	4	8
Aldwell	Ad	8	12	Houghton	Ht	70	202
Allen, L. B.	Ae	1	4	Houston	Hu	3	6
Ancarani	An	28	44	Hurahata	Hr	4	17
Baldwin, J. M.	Bl	86	157	Jones	Jo	101	418
Beck	Bk	5	5	Kohman	Ko	46	154
Benini	Be	16	32	Lacchini	L	110	165
Bigelow	Bw	28	32	Marsh	Ma	32	40
Bouton	B	4	4	McLeod	Mc	22	60
Brocchi	Br	63	97	McKnelly	My	8	12
Brown, A. N.	Bn	4	12	Meek	Me	81	222
Buckstaff, E.M.	Bf	8	29	Mennella	Mn	15	73
Buckstaff, R.N.	Bc	10	59	Millard	Md	25	34
Bunting	Bg	2	21	Monnig	Mg	11	21
Chandra	Ch	100	117	O'Byrne	Oy	1	1
Cilley	Cy	39	143	Peltier	Pt	218	532
Eliason	El	36	64	Percival	Pr	5	5
Ensor	En	79	178	Shinkfield	Sl	18	20
Flower Obs.	FO	31	37	Shultz	Sz	11	11
Gallanti	Gt	7	11	Simpson	Si	10	21
Godfrey Club	GD	8	14	Smith, F. W.	Sf	15	44
Gregory	Gy	44	74	Smith, L.	Sh	9	9
Hartmann	Hf	19	47	Smith, R.	Sr	2	3
Hildom, A.	Hi	8	12	Theile	Th	12	48

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1932.

Observer	Initial	Vars.	Observations	Observer	Initial	Vars.	Observations
Vorhies	Vh	9	9	Williams	Wi	9	9
Watson	Wa	11	15	Wright	Wr	6	10
Webb	Wd	26	63				
Wetherbee	We	46	57	Totals	55	417	3630

ANNUAL REPORT OF THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS FOR THE YEAR ENDING OCTOBER 31, 1932.

Observer	Initial	November	December	January	February	March	April	May-June	July	Aug.-Sept.	October	Totals
Ahnert	Ah	320	129	22	171	119	215	105	133	414	132	1760
Aldwell	Ad	4	..	..	..	8	14	60	48	7	12	153
Allen, L. B.	Ae	..	6	..	8	..	..	3	..	..	4	21
Allen, P. R.	Al	17	2	5	..	..	..	..	..	..	..	24
Ancarani	An	..	..	..	..	..	..	..	..	62	44	106
Baldwin, J. M.	Bl	114	150	75	130	108	110	251	271	148	157	1514
Beck	Bk	..	..	..	..	..	5	..	25	126	5	161
Benini	Be	18	..	..	..	..	..	..	18	66	32	134
Bigelow	Bw	22	24	5	21	16	35	63	10	40	32	268
Boutell	Bo	49	34	25	63	34	64	..	..	..	..	269
Bouton	B	121	88	48	70	55	67	130	30	..	4	613
Brocchi	Br	57	18	8	..	..	10	..	..	95	97	285
Brown, A. N.	Bn	13	5	8	..	..	19	5	4	9	12	75
Buckstaff, E. M.	Bf	..	1	5	..	6	7	6	36	51	29	141
Buckstaff, R. N.	Bc	7	3	16	3	11	11	8	58	118	59	294
Bunting	Bg	32	22	10	6	7	3	12	48	80	21	241
Chandler	Cn	..	..	..	..	..	10	11	18	..	..	39
Chandra	Ch	89	160	..	243	487	203	240	1	115	117	1655
Cilley	Cy	53	53	85	50	49	46	200	52	304	143	1035
Eliason	El	..	..	..	..	..	..	..	..	110	64	174
Ensor	En	128	106	75	132	129	100	189	186	244	178	1467
Flower Obs.	FO	..	..	..	36	..	..	..	..	..	37	73
Ford	Fd	..	..	..	..	15	..	26	24	..	..	65
Gallanti	Gt	..	..	..	..	..	..	..	..	25	11	36
Georgetown Col.	GC	56	28	11	..	15	..	..	..	..	..	110
Godfrey Club	GD	10	5	4	8	10	20	34	24	50	14	179
Gregory	Gy	29	..	43	20	..	22	11	34	124	74	357
Hartmann	Hf	..	..	..	29	..	7	46	26	60	47	215
Hildom, A.	Hi	..	..	10	4	..	14	16	..	17	12	73
Hildom, L.	Hl	..	..	6	4	..	15	5	..	3	8	41
Houghton	Ht	..	..	..	..	156	155	409	81	178	202	1181
Houston	Hu	48	110	6	18	122	..	..	..	32	6	342
Hurahata	Hr	..	..	..	..	..	..	22	32	6	17	77
Iedema	Ie	7	..	..	12	4	..	..	..	..	7	30
Jansen	Je	20	..	..	..	9	8	10	20	31	..	98
Jones	Jo	338	365	336	327	267	284	465	309	764	418	3873
Kanda	Kd	..	..	157	..	55	..	..	..	..	..	212
Kohman	Ko	45	..	14	29	95	125	200	82	108	154	852
Lacchini	L	372	174	252	419	367	257	431	233	576	165	3246
Levy	Lv	..	39	..	..	14	..	..	..	..	..	53
Logan	Lg	4	..	..	..	..	..	..	..	17	..	21
Marsh	Ma	18	23	26	26	..	47	12	19	28	40	239
McKnelly	My	..	..	..	..	14	17	16	..	..	12	59
McLeod	Mc	47	21	19	17	5	25	99	38	204	60	535
McPherson	Mp	24	..	9	10	20	..	..	9	16	..	88

ANNUAL REPORT OF THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS FOR THE YEAR ENDING OCTOBER 31, 1932—Continued.

Observer	Initial	November	December	January	February	March	April	May-June	July	Aug.-Sept.	October	Totals
Meek	Me	85	43	7	13	100	110	218	131	316	222	1245
Mennella	Mn	81	59	58	..	110	46	89	36	150	73	702
Millard	Md	14	23	..	..	..	..	13	60	72	34	216
Monnig	Mg	8	12	..	29	11	11	31	36	..	21	159
O'Byrne	Oy	..	..	6	6	..	..	12	..	9	1	34
Peltier	Pt	350	280	241	225	249	240	579	288	1046	532	4030
Proctor	Pc	24	..	..	..	..	..	32	32	32	..	120
Recinsky	Re	..	9	..	..	6	..	..	18	12	..	45
de Roy	Ry	42	23	10	15	44	73	70	66	78	..	421
Schulman	Sn	..	..	..	..	44	47	74	..	..	..	165
Shinkfield	Sl	..	90	50	65	68	84	72	89	110	20	648
Shultz	Sz	6	5	..	5	6	1	10	11	24	11	79
Simpson	Si	89	27	..	..	..	..	31	74	186	21	428
Smith, F. W.	Sf	42	36	27	32	15	20	50	32	45	44	343
Smith, L.	Sh	8	10	27	23	20	22	47	18	17	9	201
Theile	Th	87	23	19	30	36	52	39	49	77	48	460
Watson	Wa	..	8	..	..	..	..	11	..	19	15	53
Webb	Wd	55	39	35	55	31	49	144	82	135	63	688
Wetherbee	We	19	7	..	..	13	14	39	27	82	57	258
Whitney	Wy	28	..	7	22	6	7	..	..	..	..	70
Williams	Wi	..	..	..	..	28	39	31	..	..	9	107
29 Others	..	30	22	11	38	16	10	32	34	12	27	232
Total												33,188

SUMMARY OF ANNUAL REPORTS, 1912-1932.

Year	Observations	Observers	Year	Observations	Observers
1912	6,180	19	1923	17,745	68
1913	12,914	20	1924	19,484	70
1914	14,506	28	1925	23,375	68
1915	14,724	29	1926	17,990	74
1916	11,261	30	1927	17,600	75
1917	15,788	43	1928	23,144	78
1918	16,112	34	1929	27,218	61
1919	8,710	53	1930	26,823	76
1920	9,099	69	1931	26,273	81
1921	15,513	77	1932	33,188	94
1922	16,994	72			
			Totals	374,543	407*

*Approximate number of different observers.

November 11, 1932. LEON CAMPBELL, *Recorder.*

Meteor Notes from the American Meteor Society

By CHARLES P. OLIVIER, President

As these notes are being written, reports on the Leonids seen last week are coming in steadily. Already 33 stations in 16 states have sent in their results. At some of these stations there was only one observer; at some, two; at many, from four to six; at one, twenty-five—this group being at the home of our enthusiastic member, Mr. J. A. Kingsbury, high up in the Catskill Mountains. From some of

the observers in our organized chains of stations no word has yet come, as it will take them considerable time to prepare their results for submission and comparison. It is hence at present impossible to give even a vague idea of the number of heights and train-drifts that may be derived from our campaign.

For the first time in five years, the weather at the Flower Observatory during the Leonid epoch was mostly favorable. Monday night (November 14-15) was wholly clear; Tuesday night was clear until about 14:30; Wednesday night, mostly clear after 16:00; and Thursday, clear until about 17:00. One party watched from the Observatory grounds, and a second was stationed for the first two nights about two miles west, in the open country. The latter observers saw fifty per cent more meteors, due to the absence of arc lights and other city factors. The experience of both parties definitely proves that the vicinity of Philadelphia is very poor for meteor work—as we already well knew.

It is our intention, probably in the next Meteor Notes, to give a detailed account of the reports from all stations; here we will confine ouselves mostly to general remarks, based of course upon the partial data so far at hand, half of which comes from places not over three hundred miles from here. Partially or totally cloudy skies on the most probable nights have been reported from western Pennsylvania, central New York, Ohio, Kentucky, Florida, and Oregon.

The maximum seems to have fallen on Tuesday night, November 15-16, as expected, but it was vastly inferior to that of 1866. The bright moonlight cut out fainter meteors, but despite this, observers located in the best positions and with really transparent skies reported rates of 30± meteors per hour on Tuesday night. The rate fell off very sharply for Wednesday night, and very few Leonids appeared on Thursday night, showing the usual quick falling off after maximum. Here the rate on Monday night was far below that on Tuesday, and the brilliancy of the meteors on the average markedly inferior. Mr. Kingsbury's party so far leads all in numbers reported; they saw 901 on Tuesday night, but were favored by an ideal station from which to observe.

The maximum display was enriched by numerous bright meteors, two seen from McDaniel, Maryland, leaving 9 and 11 minute trains respectively. Observations of these two were also reported from York, Pennsylvania, and one of them probably from the station in Howard County, Maryland. Moonlight, cutting out comparison stars, made plotting more difficult and will necessarily add to the accidental errors of radiant, height, and drift determinations. We fear that persons trying photography may have met with little success because of the smaller number of meteors than was expected, but one photograph was secured from Sykesville (Howard County), Maryland.

It is obvious that our high hopes for a great shower were disappointed. Yet making due allowance for moonlight, this year's maximum was quite comparable with that of 1931. For this November we had planned a great coöperative campaign all over the country and perfected the organization. To all the persons included therein, as well as others who kindly report, we desire to make the following request: Please do not be unduly discouraged by this year's relatively poor display. It does not prove that the return of 1933 or even of 1934 may not be much richer. In fact we cannot predict what meteors are going to do. Remember that after poor displays in 1899 and 1900, the Leonids gave an excellent final display in 1901. So we earnestly beg of all our colleagues in this coöperative campaign to keep their unused maps, blanks, instructions, and above all their expressed and appreciated enthusiasm, and try again next November! We will

not then be hampered by moonlight — the curse of last week's display — and the experience gathered, particularly by beginners, will make all the more valuable observers for next year.

The writer desires to thank one and all for the unselfish help they have given, and the trouble they went to in preparation. While our results are fewer than we hoped for, they are still valuable, and we have done much to create an interest with the intelligent public in meteoric astronomy. It should be added that the newspapers of the country gave excellent and conservative advance publicity for which the A.M.S. is under many obligations.

The accompanying table contains the last of the radiants for 1926, derived here. It also contains 1931-32 radiants from New Zealand derived by R. A. McIntosh, Nos. 2675-2678 from his own work, and the rest from the work of M. Geddes.

RADIANTS.

A.M.S. No.	Date G.M.T.	α °	δ °	Meteors	Wt.	Observer and Remarks
1542	1926 Aug. 11.2	45.0	+56.9	8	Good	H. L. Alden. Perseids.
1543	1926 Aug. 10.7	30.5	+10.2	3-4	Fair	H. L. Alden
1544	1926 Aug. 11.2	57.3	+ 0.3	3	Fair	H. L. Alden. See 2064
1545	1926 Aug. 10.7	359.	+39.	3	Fair	H. L. Alden
1546	1926 Aug. 27.8	250	+63.5	4	Fair	A. Grote
1547	1926 Mar. 19.0	174.5	—21.	3	Fair	R. A. McIntosh. See 2515. 888.
1548	1926 April 10.1	220.	—48.	6	Good	R. A. McIntosh
1549	1926 May 15.0	249.5	—26.	9	Good	R. A. McInt. See 2606
1550	1926 July 28.2	340.	— 8.	5	Fair	R. A. McIn. δ Aquarids
1551	1926 July 28.2	340.	—17.	5	Fair	R. A. McIn. δ Aquarids
1552	1926 Aug. 11.8	45.0	+55.9	19	V. Good	C. P. Olivier. Perseids
1553	1926 Aug. 12.8	45.1	+57.8	12	Good	C. P. Olivier. Perseids
1554	1926 Feb. 16.9	154.	—61.5	3	Poor	I. L. Thomsen
2625	1932 Aug. 11.9	45.6	+52.7	18-19	Good	C. B. Ford. Perseids
2626	1931 Aug. 2.39	343.	—16.	3-4	Fair	(2626 through 2674 by M. Geddes.) δ Aquarids
2627	1931 Aug. 4.49	342.5	—33.5	4-5	Good	See 201?, 2014?
2628	1931 Aug. 4.49	348.0	—15.0	9	Good	δ Aquarids
2629	1931 Aug. 2-4c	304.0	—11.0	7	Good	See 2026, 2039
2630	1931 Aug. 5.44	321.	— 9.	13	Good	See 2634
2631	1931 Aug. 5.44	322.0	—17.5	10-13	Good	See 2638
2632	1931 Aug. 5.44	336.0	—13.0	8-9	Good	See 2136
2633	1931 Aug. 5.44	350.0	—14.0	4-5	Good	δ Aquarids
2634	1931 Aug. 6.47	319.5	— 6.5	3	Fair	See 2046, 2630
2635	1931 Aug. 6.47	349.5	—14.0	10	Good	δ Aquarids
2636	1931 Aug. 5-6c	297.	—22.	8	Poor	See 2637
2637	1931 Aug. 7.51	297.0	—22.0	6	Fair	See 2636
2638	1931 Aug. 7.51	324.0	—14.5	6	Good	See 2631
2639	1931 Aug. 7.51	336.0	± 0.0	4	Good	See 2643
2640	1931 Aug. 7.51	351.0	—19.5	3	Good	See 2645
2641	1931 Aug. 7.51	352.0	—12.5	12	Good	δ Aquarids
2642	1931 Aug. 9.56	29.0	—20.0	6	Good	See 2137
2643	1931 Aug. 9.56	336.5	— 1.0	5	Good	See 2639
2644	1931 Aug. 9.56	340.3	—26.7	7-8	Good	
2645	1931 Aug. 9.56	352.0	—21.5	6	Good	See 2640
2646	1931 Aug. 9.56	352.5	—12.0	8-10	Good	δ Aquarids
2647	1931 Aug. 13.52	11.0	—30.5	10	Poor	See 2652
2648	1931 Aug. 13.52	314.0	—23.0	5-6	Good	
2649	1931 Aug. 13.52	335.0	—13.0	5	Good	
2650	1931 Aug. 13.52	336.5	—26.0	3-6	Fair	
2651	1931 Aug. 13.52	350.5	— 5.7	7-9	Good	

A.M.S. No.	Date G.M.T.		α °	δ °	Meteors	Wt.	Observer and Remarks
2652	1931 Aug.	14.50	11.5	−33.0	3	?	See 2647
2653	1931 Aug.	14.50	23.7	−15.0	1	Good	Stationary
2654	1931 Aug.	14.50	327.0	−30.0	7	Good	
2655	1931 Aug.	21.66	39.0	+ 9.5	5	Good	
2656	1931 Aug.	21.66	61.0	− 2.5	5	Good	
2657	1931 Aug.	21.66	81.5	− 7.5	1	Good	Stationary
2658	1931 Aug.	21.66	103.0	−50.3	4	Good	
2659	1931 Oct.	2.51	38.7	− 9.5	4	Poor	
2660	1931 Oct.	2.51	55.0	− 5.0	4	Good	
2661	1931 Nov.	18.62	150.7	+21.4	4	Good	Leonids
2662	1931 Dec.	3.51	117.0	−40.0	6	Good	See 2667
2663	1931 Dec.	3.51	122.0	−50.8	5	Good	
2664	1931 Dec.	4.51	65.0	− 8.3	2	Good	1 Stationary
2665	1931 Dec.	4.51	92.3	+19.5	4	Fair	
2666	1931 Dec.	4.51	113.0	−44.8	5-6	Good	
2667	1931 Dec.	4.51	118.3	−40.8	3	Fair	See 2662
2668	1931 Dec.	3-4c	102.0	+27.5	2	Poor	
2669	1931 Dec.	3-4c	102.3	−48.2	5	Good	
2670	1931 Dec.	3-4c	147.0	−47.5	5	Good	
2671	1931 Dec.	10.54	82.5	−28.8	1	Good	Stationary
2672	1931 Dec.	10.54	113.0	−41.7	4-5	Fair	
2673	1931 Dec.	10.54	127.1	− 3.3	4	Good	
2674	1931 Dec.	10.54	131.0	−62.0	2-4	Good	
2675	1931 Oct.	22.65	98.0	+15.3	3	Fair	R. A. McInto. Orionids
2676	1931 Oct.	22.65	99.0	−17.0	3	Poor	R. A. McIntosh
2677	1931 Nov.	15.64	115.0	− 9.3	1	Good	R. A. McIntosh
2678	1931 Dec.	13.62	101.0	+28.5	5	Good	R. A. McInto. See 301?
2679	1932 Jan.	6.50	115.0	−14.8	4-5	Fair	(2679 through 2721 by M. Geddes.)
2680	1932 Jan.	6.50	168.0	−59.0	5-6	Good	
2681	1932 Jan.	12.53	180.0	−15.6	5	Good	
2682	1932 Jan.	12.53	184.0	−64.0	3-6	Fair	
2683	1932 Feb.	3.52	203.5	−37.5	5	Fair	
2684	1932 Feb.	3.52	209.0	−31.0	4	Good	
2685	1932 Mar.	6.52	185.9	−69.0	4	Good	
2686	1932 Mar.	6.52	242.7	−54.7	6	Good	
2687	1932 Mar.	7.49	162.0	−15.6	4-5	Good	
2688	1932 Mar.	7.49	205.0	−34.0	3-4	Good	
2689	1932 Mar.	7.49	263.0	−78.8	1	Good	Stationary
2690	1932 Mar.	11.53	200.2	−36.5	3	Fair	
2691	1932 Mar.	11.53	240.0	−52.0	5	Good	
2692	1932 April	6.53	222.5	−11.5	4-6	Good	
2693	1932 May	2.62	258.0	−20.0	4-5	Fair	
2694	1932 May	2.62	295.0	−40.0	4	Good	
2695	1932 May	2.62	318.	−36.	5	Fair	
2696	1932 May	2.62	333.5	− 2.5	5	Fair	η Aquarids
2697	1932 May	4.65	277.0	−24.0	4	Fair	See 2157, 2704
2698	1932 May	4.65	284.0	−16.0	4	Fair	See 2706
2699	1932 May	4.65	294.5	−25.5	6	Good	
2700	1932 May	4.65	286.7	− 5.0	5	Fair	
2701	1932 May	4.65	320.0	−19.0	4	Good	See 2153, 2709
2702	1932 May	4.65	337.5	− 2.0	34	Good	η Aquarids
2703	1932 May	4.65	346.0	−45.5	3	?	See 2711
2704	1932 May	5.67	276.0	−23.5	2	?	See 2157?, 2697
2705	1932 May	5.67	281.0	−36.0	5	Fair	
2706	1932 May	5.67	285.0	−15.0	4-5	Fair	See 2698
2707	1932 May	5.67	293.0	+10.0	7	Good	See 2715
2708	1932 May	5.67	308.0	+15.0	4	Good	See 1908, 1913, 2169, 2174, 2717

A.M.S. No.	Date G.M.T.	α °	δ °	Meteors	Wt.	Observer and Remarks
2709	1932 May 5.67	321.0	—18.0	6	Fair	See 2153, 2701
2710	1932 May 5.67	337.5	— 0.8	23	Good	η Aquarids
2711	1932 May 5.67	346.0	—46.7	5	Good	See 2703
2712	1932 May 6.69	325.0	—33.0	3	?	See 1902, 1915, 2155, 2158, 2162, 2719
2713	1932 May 6.69	338.6	— 0.6	29	Good	η Aquarids
2714	1932 May 8.68	270.0	— 8.6	4-6	Good	See 1906
2715	1932 May 8.68	294.7	+10.0	2	?	See 2707
2716	1932 May 8.68	303.8	—16.8	3.5	Good	See 1912, 1924
2717	1932 May 8.68	309.2	+14.2	4	Good	See 1908, 1913, 1925, 2169, 2174, 2708
2718	1932 May 8.68	318.0	—57.0	4	Good	
2719	1932 May 8.68	323.0	—34.0	6	Good	See 1915, 2162, 2712
2720	1932 May 8.68	339.3	+ 1.0	12-13	Good	η Aquarids
2721	1932 May 31.42	217.7	—17.2	1	Good	Stationary

Flower Observatory, Upper Darby, Pennsylvania, 1932 November 21.

Preliminary Report on the 1932 Leonids

By C. C. WYLIE

Arizona. Reticles were set up on the Lowell Observatory grounds in Flagstaff, and on the property of Harry E. Locke, about thirty-five miles east of Flagstaff. The astronomers at Lowell Observatory and Mr. Locke extended every courtesy to the members of the party. Observations were made at the two stations on the nights of November 13, 14, 16, and 17 astronomical time; and some meteors were observed simultaneously on each of the four nights. The night of November 15 was cloudy or partly cloudy over Arizona, and it was impossible to secure observations by moving the reticles to other stations as had been considered. The party on Mr. Locke's property saw several bright meteors through clouds, and knew that the maximum display for Americans had occurred that morning; but no estimate of the hourly number was possible. Some observations for determining the radiant were made, and a camera equipped with a rotating sector was set up. A preliminary inspection of the films shows no meteor trails, but such had hardly been hoped for excepting on the night of maximum, which was missed because of clouds.

In addition to the work on the Leonid meteors, the party visited Archie, Missouri, and inspected the meteorites which fell August 10, 1932. Several observers of the daylight meteor which dropped the stones were interviewed in Baldwin, Kansas, and Kansas City, Missouri. A preliminary report on this meteor by Professor E. S. Haynes of the University of Missouri will appear later.

Iowa. The nights of November 12, 13, and 14 were partly cloudy to completely overcast, but the night of November 15, cloudy in Arizona, was clear in Iowa. Reticle observations for determining the real heights were made at Iowa City and Mount Pleasant. Some radiant observations were also made at both places.

Daylight Meteors. In notes given to Science Service and the Associated Press before the shower, the writer pointed out that if a good display should be seen in the early morning hours by residents of Japan and China, several daylight meteors should be seen by residents of the United States, and it was suggested that such might be seen on the forenoon of November 16, Civil Time. The Dubuque observers, under the direction of Father J. A. Theobald, reported two

daylight meteors, the first at about 7:30 A.M., and the second at about 9:00 A.M. On the morning of the maximum, the count at Dubuque reached 240 per hour, or four per minute. The hour of maximum cannot be estimated until reports from other parts of the world are received.

University of Iowa, November 24, 1932.

Observations of the Leonids made at the Yale Observatory

A group of six people including Miss Ida Barney, Mr. and Mrs. A. L. Bennett, Messrs. D. Brouwer, T. G. Mehlin, and J. S. Hall observed the Leonids from the top of the Loomis Telescope Tower on the morning of November 16.

The sky was poor. Aside from the moonlight, there was a general haziness and intermittent clouds. The consensus of opinion was that no meteors were seen which were fainter than third magnitude. This opinion was substantiated by the fact that only four non-Leonids were observed in an interval of two hours and fifteen minutes. The equivalent of about one-ninth of this interval was estimated completely cloudy.

A total of 95 Leonids was seen in this interval, and if we make due allowance for clouds this total should be increased to 107. This gives an average of about 0.8 meteors per minute. The observations began at 1:15 E.S.T. The number observed increased to a maximum of about one per minute at 3:00. At 3:30 the sky became hopeless and the watch was abandoned.

Perhaps the most unusual feature of the observations was the large proportion of bright meteors. Approximately half of them were considered brighter than Procyon and one-fifth were judged brighter than Sirius. Soon after the observations were begun Mr. Bennett pointed the 8-inch Reed Telescope at the radiant but failed to see a single meteor during a twenty-minute search, although the field was little smaller than the angular size of the moon; he should have seen meteors at least as faint as the ninth magnitude.

More meteors were seen in Ursa Major than in Leo and the brightest meteor of all streaked across the sky south of Orion. Its magnitude was about —5, a non-Leonid.

J. S. HALL.

Yale Observatory, 1932 November 17.

Observations of the Leonid Shower at Minnesota

Wholly or partly cloudy skies prevented any observations previous to November 14. During the night of November 14-15 it was clear for a few hours and some advance Leonids were seen. On November 15-16 the sky was perfectly clear all night and watch was kept, beginning shortly after midnight, by a large group of students interested in astronomy. Those chiefly responsible for the actual observations—counts as well as recorded paths—were Edwin Ebbighausen, Homer D. Hagstrum, Eleanor Lawrence, and Arnold Rosenstein.

In all about 200 meteors were seen, of which 170 were recorded between 1:12 and 4:38. The paths of about 80 of these were plotted.

Through the courtesy of the Naval Reserve Aviation base the undersigned was given the opportunity to ascend in an airplane to an altitude of 17,000 feet. While this flight had been arranged chiefly for fear of cloudy weather, it did serve its purpose even with a clear sky, as 29 Leonids were seen by a single observer between 3:02 and 3:58 A.M.

W. J. LUYTEN.

University of Minnesota, Minneapolis.

Leonids Observed in San Francisco

The following observations were taken on the Leonids in San Francisco by Silvio Martinelli, John Burrafato (of the Galileo High School Astronomy Class), Alfred Cipporon, Mr. Albert Barnett, and the writer. November 15 Eastern sky hazy until after midnight: Meteorites were observed at the following times: 1:05, 1:11, 1:15, 1:27, 1:43, 1:49, 1:59, 2:06, 2:10, 2:16, 2:20, 2:23, 2:24, 2:25, 2:44. At 3:59, 4:25, and 4:44 meteorites were observed by the first three gentlemen. The trains of the Leonids averaged thirty minutes in length. Positions were plotted.

November 16. Sky heavily overcast.

November 17. The writer observed meteorites at 3:40, 4:03, 4:26, and 4:27. The one at 4:03 was as brilliant as Jupiter with a train 2 degrees in length. Five meteorites were observed by Mr. Albert Barnett between 5:25 and 5:35.

November 18. Two meteorites were observed by the writer between 5:50 and 6:18.

HENRY RAPHAEL.

Galileo High School, Francisco and Van Ness,
San Francisco, California, November 18, 1932.

Meteor Observed

On the night of November 4, at 8:30, Eastern Standard Time, I viewed a meteor which started at a point in Camelopardalis equidistant from α and β Persei, at R.A. —60°, Decl. +52°, and which passed through the constellation Camelopardalis and ended at a point about one degree from o Ursa Major. It had a yellow color, and was somewhat brighter than Saturn. The observed time was about 1½ sec, and it also left a train visible several seconds after its disappearance.

Approximately six minutes later, another, a magnitude or so brighter, passed through the field of observation. The duration of the appearance was about two seconds, and it also had a beautiful train remaining visible for fully six seconds. The color of the latter was green. This meteor started at a point near o Ursa Major, and passed to the other end of Ursa Major in nearly a straight line. The end point was fixed as R.A. 200°, Decl. +56°, near Mizar.

ALFRED SCHENKMAN.

R.F.D. 2, New Brunswick, New Jersey, November 10, 1932.

Zodiacal Light Notes

By W. E. GLANVILLE

AUSTRALIA. A most interesting report of a study of the luminosity of the night sky is contained in Memoir I of the Commonwealth Solar Observatory, Canberra. Dr. W. G. Duffield and his colleagues concluded that the *continuous spectrum* of the faint white background all over the sky (but intensified in the Zodiacal area, together with fluctuations noted) "may be an auroral effect of a new kind but still of corpuscular origin. Nor can we exclude the suggestion that it is an afterglow resulting from the recombinations of ions previously separated by sunlight (in the day sky) or by electric discharges in the atmosphere . . . It was found that the relationship between the red, auroral and blue components of the light of the night sky was of the same nature as that to be expected if they were all separate portions of a continuous spectrum . . . The fact that the average night sky has a spectrum with the same intensity as moonlight or the sunlit sky is very strong evidence that it owes its origin to sunlight." The work was

done with Rayleigh photometers in 1926 and 1927.

From Mr. J. Fraser Paterson, Broken Hill, New South Wales, a report has been received of 12 observations between July 4 and 17. On July 6 he found the evening Light resembling a huge wedge extending 90° from the horizon in Leo to the Milky Way in Scorpio. On July 7 and 8 he made morning observations between 5:45 and 6:10 A.M. and determined the apex between Aldebaran and the Pleiades. He estimated the extension of the Light from horizon to apex to be 60°.

Mr. Chester Richardson, King Island, Tasmania, an observer of the Zodiacal Light for 30 years, reports that between 1926 and 1928 the Light was unusually bright at his station but that it has decreased considerably in brightness since that time. While the brightness intensity seems to have a direct connection with the sunspot period, Mr. Richardson suggests that the shifting of the rain belt across the Indian Ocean and Tasmania to a more northerly zone corresponding to the latitude of Freemantle, W. Australia, may account, in part, for the increased brightness noted. This shift he had noticed in previous years. Possibly shifting weather conditions may have some connection with the vicissitudes of the sunspot period.

Morning Zodiacal Light and Gegenschein. The writer made observations of the morning Light on September 30 and October 1 between 4:15 and 4:35 A.M. The Light was seen in Leo and Cancer but owing to the presence of Mars in Cancer and Venus and Jupiter in Leo it was impossible to estimate the boundaries satisfactorily. As a general statement it may be said that near the horizon the main body of the Light was north of the ecliptic.

Especial attention was given to the Gegenschein on September 24, 29; October 22, 27, and November 1.

On September 24 it was seen rounding from Omega in Pisces, thence to Iota in Cetus, thence to Epsilon in Pisces and on round to Omega. Estimated diameters E and W, 18°, N and S, 15°. On September 29 it was seen skirting Eta and Omicron in Pisces, thence round to Gamma in Pegasus. Epsilon in Pisces which was on the east edge on September 24, was now almost central. Estimated diameters same as on September 24. Both observations showed the body distinctly circular. On October 22 it was observed due south of the Aries stars. It was extremely blurred; shape generally elliptic. On October 27 it was again seen south of the Aries stars as a faint elliptic blur on a Zodiacal band. On November 1 it was seen, this time east of its position on October 27 and of the same general elliptic shape as on October 22 and 27. All of these observations were made between 10:30 and midnight. Throughout the series the exceeding faintness of the object was very noticeable.

During December the Gegenschein will be crossing the Milky Way. In January it will be passing through Gemini when a study of its shape should be worthwhile.

The Rectory, New Market, Maryland.

General Notes

Amateur Telescope Makers of Chicago

At the regular monthly meeting of the Amateur Telescope Makers of Chicago, at the Adler Planetarium on November 8, Dr. J. Comstock, Metallurgist of the Peoples Gas Light and Coke Company, gave a very interesting talk on polishing

metals, particularly chromium steel, which was followed by a discussion of the feasibility of making specula of polished steel. Professor Arthur Howe Carpenter, President of the club, spoke on the importance of members using their finished instruments on useful astronomical work and outlined some of the branches of atsronomy in which systematic visual observation would produce scientific results.

1319 West 78th Street, Chicago, Illinois. WM. CALLUM, *Secretary.*

Observatory Coöperation

An arrangement has been made between the Yerkes Observatory of the University of Chicago and the Perkins Observatory of Ohio Wesleyan University whereby half of the observing time of the 69-inch Perkins reflector will be available for extending the spectroscopic program of the Yerkes Observatory. The Yerkes Observatory has provided the necessary spectrograph, and will add a part time observer to the staff of the Perkins Observatory for this purpose.

The Mathematical Association of America

The seventeenth annual meeting of the Mathematical Association of America will be held at Atlantic City, New Jersey, on Tuesday and Wednesday, December 27-28, 1932, in affiliation with the American Association for the Advancement of Science and the American Mathematical Society. The meetings will be held at the Hotel Morton.

The program, made up of invited speakers, will consist of separate sessions of the Association on Tuesday afternoon and Wednesday morning, and a joint session of the Mathematical Association, the Mathematical Society and Section A of the American Association on Wednesday afternoon. At the joint session Dean Eisenhart will give his retiring presidential address on the part of the Society and Professor Hedrick will give his retiring address as vice-president of Section A. The annual business meeting and election of officers will be held at the close of the session on Wednesday morning. The complete program will be mailed to members early in December, as usual.

For Friday a trip to Princeton University has been arranged, where there will be an opportunity to inspect the new mathematics building, Henry Burchard Fine Memorial Hall, luncheon will be served at 12:30, and a symposium will be held at 2:00 P.M. in Fine Hall on "Application of the operational calculus to mechanics." Professor J. von Neumann will speak and Professor G. D. Birkhoff will lead the discussion.

The Reinmuth Asteroid 1932 HA

From Crommelin's latest elements of this remarkable object F. E. Seagrave has computed its next perihelion, which comes in 1934. He sends an ephemeris from which we abstract the following figures:

		h m	°
1934 April	1	21 26	−18.6
	17	23 8	− 9.9
May	3	0 38	+ 0.2

Note on the Reinmuth Object

The new planetoid recently discovered by Reinmuth has been the subject of articles in almost every astronomical journal all of which have, of course, commented upon its unusual character. The most unusual feature of this new planetoid, and one which, in my opinion, makes it unique in the solar system does not yet appear to have attracted any attention, viz., its possible close approach to

the planet Venus. Where, of course, every article has mentioned the fact that this object is the only one now known which crosses the orbits of the earth and Venus, it seems to have been generally overlooked that the approach to Venus may be an exceedingly close one.

Taking the elements as given on *H.A.C.* 218, and the data for Venus, as given by Russell, Dugan, and Stewart, we find that for the positions in the two orbits with true anomalies of 45° 53′ for the Reinmuth object and —123° 55′ for Venus, respectively, the distance is only 0.00090 astronomical units, or only 134,000 km, slightly more than one-third mean distance of the moon. Using the first orbit, one would get a distance only slightly greater. It is evident, if this new planetoid continues anywhere near its present orbit, that interesting developments may be expected in future, and we may well hope to obtain a new and much better value of the mass of Venus from perturbations at such approaches. The relative velocity at closest approach appears to be of the order of 20 km/sec, and hence it is out of the question for Venus to effect "capture."

University of Minnesota, Minneapolis. W. J. Luyten.

Temperature Changes During Eclipse

The writer was interested in recording temperatures at two minute intervals for a period of about thirty minutes before and thirty minutes after the maximum phase of the eclipse of the sun on August 31, 1932. The observations were taken in Indianapolis, Indiana, Central Standard Time. The thermometer used was graduated in tenths of a degree F, and the temperatures observed were direct sun readings. No clouds were present during any of the readings.

Beginning at 1:59 P.M. with a temperature of 97°.9 F the temperature dropped to 94°.4 F at 2:13; that is 3°.5 in fourteen minutes or exactly 0°.25 F per minute. In the next six minutes, that is from 2:13 to 2:19, the temperature rose from 94°.4 to 95°.6 or at the rate of 0°.2 F per minute. Thereafter the temperature decline was again at 0°.25 F per minute from 2:19 until 2:31. At 2:26 the maximum shadow of 79% was reached, but the temperature continued to drop at about 0°.25 F per minute until 2:31 when the minimum of 93°.5 F was attained; after which the temperature started to rise. From 2:31 until 2:55 the rise was 2°.5 or about 0°.1 F per minute. From 2:55 until 2:57 the temperature for some unknown reason dropped 1°.4 to 94°.6. From 2:57 until 3:09 the temperature rose from 94°.6 to 97°.4 or 2°.8 in 12 minutes, being about 0°.23 per minute. This ended the observation.

The rise in temperature at 2:13 when the sun was being more and more obscured, and the fall in temperature at 2:55 when the sun was being more and more unobscured are two phenomena for which I can give no explanation.

Another point of interest to note is that the minimum temperature came about five minutes after the maximum shadow. This lag of course is easily understood. Another point of interest is that the temperature declined about 4°.4 and rose again about 4° following the eclipse. The temperature effect was apparently limited to about thirty minutes before and about forty-five minutes after the maximum shadow.

William A. Hanley.

The American Astronomical Society will hold its forty-ninth meeting at Atlantic City, December 27-29, 1932. These sessions will be in affiliation with the American Association for the Advancement of Science. The fiftieth meeting will be held at Chicago about June 22-24, 1933.